



3 1761 06892200 4

1-30 Same

31 long notes by David

32 fish note

33 Herald on Floods

34 Irrigation

35 L. George

36 L. Menéndez verbatim

37 Climate 6 pp

38 Geology better map from D.

39 ap's is bad

40 Glossary geology

Minerals 8 pp

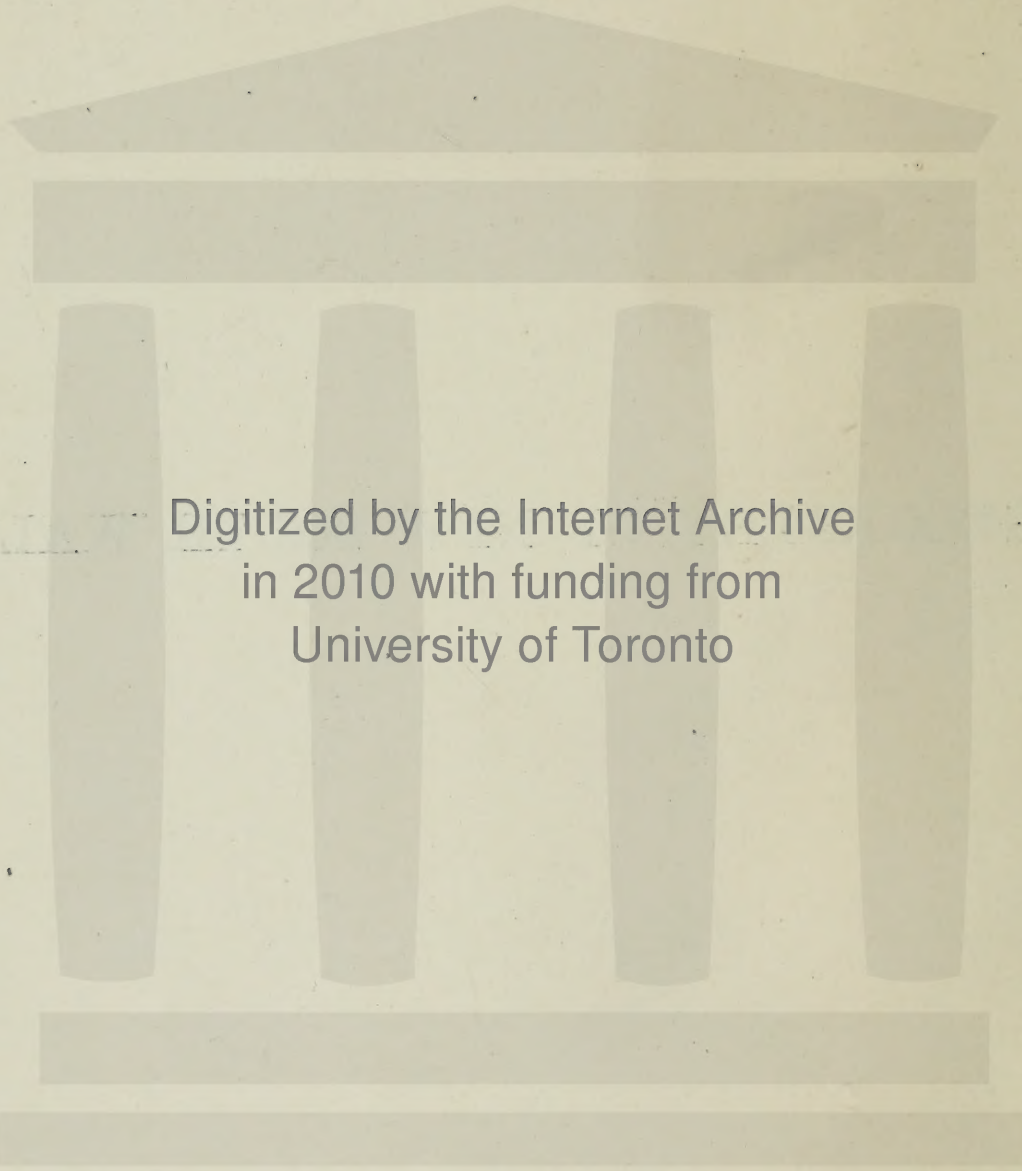
Artesian water 3 pp

Imports

Exports

} sheets amplified
+ c

GEOGRAPHY OF NEW SOUTH WALES



Digitized by the Internet Archive
in 2010 with funding from
University of Toronto



Copyright Photo.

Kerry, Sydney.

CAPTAIN COOK'S STATUE, HYDE PARK, SYDNEY.

12-2-

GEOGRAPHY

OF

NEW SOUTH WALES

BY
J. M. TAYLOR, M.A., LL.B.

*Fourth edition, revised and enlarged,
with 80 Illustrations and Maps*

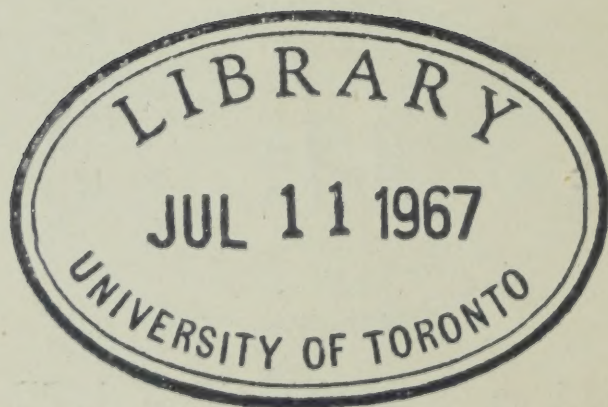


ANGUS & ROBERTSON [LTD.

89 CASTLEREAGH STREET

1912

Printed by
W. C. Penfold & Co., 183 Pitt Street, Sydney,
for
Angus & Robertson Limited.
London : The Oxford University Press
Amen Corner, E.C.



CONTENTS

	Page
Discovery and Name	1
Boundaries and Extent	2
Capes	3
Islands	9
Inlets and Harbours	11
Lagoons	20
Surface—The Coast District	23
The Tablelands	26
The Great Plains	32
Mountains—The Great Dividing Range	37
Lateral Spurs	46
Western Spurs	54
The Coast Ranges	57
Ranges of the Interior	60
Isolated Mountains	60
Extinct Volcanoes	64
Rivers	66
Of the Eastern Slope	80
Of the Southern Slope	95
Of the Western Slope	95
Lakes	109
Climate—Temperature	116
Rainfall	118
Winds	120
The Native Fauna	129
Geology	130
Mines and Minerals	147
Artesian Water	160
Industries	164
Manufactures	180
Imports	181
Exports	184
Government	185
Submarine Cables	192
Townships	195
Railways	253
Tourist Resorts	255
Population	258
Sydney Water Supply	260

Bureau of the

73

ILLUSTRATIONS

	Page
Statue of Captain Cook	<i>Frontispiece</i>
Nobby's—Newcastle	5
Hornby Lighthouse—Sydney Heads	7
View in Sydney Harbour	15
Estuarine Beds—Shea's Creek	16
Monument erected on Captain Cook's Landing Place	17
An Illawarra Scene—Stanwell Park	24
Relief Map of Australia	29
Snow Drift on Mount Kosciusko	43
Hotel Kosciusko in Winter	45
Katoomba Falls—Blue Mountains	49
Govett's Leap—Blue Mountains	51
The Lithgow Zig-zag	53
Sturt's Depot Glen	61
Distant View of Mount Warning	63
Burrinjuck Dam—Upper Murrumbidgee	77
Berrembed Weir above Narrandera	79
Hauling Cedar to Port—Richmond River	81
Clarence River near Maclean	83
Hunter River near Morpeth	89
Hawkesbury Railway Bridge	91
Darling River at Bourke	101
Lake Albina—Mount Kosciusko	113
Lake Cootapatamba, or Lake May	115
Club Lake	117
Permo-Carboniferous Fossils—Newcastle Beds	137
Aspect of Site of Sydney in Triassic Times	139
Thinnfeldia Odontopteroides	141
Columnar Basalt—Kiama	143
Skull of <i>Diprotodon Australis</i>	144
<i>Diprotodon Australis</i> (Restored)	145
Ophir Bluff—Summer Hill Creek	149
Gold Cradling at Tumberumba	151
Broken Hill Silver Mines	153
Casting Copper Ingots—Cobar Refinery	155
Artesian Bore—Western N.S.W.	163
Wheat Stack in a Country Railway Yard	169
Hawkesbury Agricultural College	173
General Post Office—Sydney	197
Sydney Central Railway Station	199
Proposed North Shore Bridge	201
Proposed Tunnel under Sydney Harbour	201

ILLUSTRATIONS (*continued*)

	Page
Sutherland Dock—Cockatoo Island	203
Surf Bathing at Coogee	205
Loading Coal at Newcastle	207
View of Kiama Harbour	221
Shoalhaven River Bridge—Nowra	223
Commonwealth Portland Cement Works	231
View of Bathurst	233
Portion of Federal Capital Site	239
Camel Train—Warrego District	247
"Show Room"—Jenolan Caves	257
Cataract Dam	261

DIAGRAMS

Section along Western Railway—Sydney to Dubbo	27
Longitudinal Section of Main Dividing Range	27
Direction of Wind Circulation in Southern Hemisphere	122
Types of Australian Weather	123-5
Section through Blue Mountains—Jenolan to Nepean River	133
Section from Mount Victoria to Edge of Continental Shelf	135
Diagrams shewing identity of Newcastle, Illawarra and Lithgow Coal Measures	157
Aggregate Value of Coal Production	159
Aggregate Value of Wool Production	165
Yearly Production of Butter	177
Yearly Value of Dairying Products	177
Imports and Exports	182
Population of N.S.W.	259

MAPS

(For general convenience these are bound together in the centre of the book.)

1. Tableland and Western Slope—Northern Section
2. Coastal District—Northern Section
3. Tableland and Western Slope—Middle Section
4. Coastal District—Middle Section (with Diagram of Coal-bearing Rocks)
5. Tableland and Western Slope—Southern Section
6. Coastal District—Southern Section
7. Mountain and River Systems
8. Section along each Parallel of Latitude
9. River Basins
10. Relief Map
11. Railways
12. Sydney Water Supply
13. Railways of Australia

GEOGRAPHY

OF

NEW SOUTH WALES.

DISCOVERY AND NAME.

In 1770, Captain Cook, in his ship, the *Endeavour*, coasted along the whole of the eastern seaboard of Australia (or, as it was then called, *New Holland*), and, according to the editor of his journals, bestowed upon the region he discovered the name *New South Wales*.* On the 26th

*When the *Endeavour* returned to England, Cook's journals, as well as those of Banks, Solander and others of the ship's officers, were handed over to Dr. Hawkesworth, a well-known literary man of the time, to prepare them for the press. Hawkesworth, for the purpose, as he himself says, of "bringing the adventurer and the reader nearer together," wrote his account in the first person, and so embellished Cook's simple narrative by numerous observations of his own, that several statements are met with which do not occur in Cook's log as reprinted by Government authority in the "Historical Records of New South Wales." An important discrepancy occurs, for instance, in connection with the name *New South Wales*. With regard to it Hawkesworth (vol. iii., p. 616) says:—

"As I [*i.e.*, Captain Cook] was about to quit the eastern coast of New Holland which I am confident no European had ever seen before, I once more hoisted English colours, and, though I had already taken possession of several particular parts, I now took possession of the whole eastern coast . . . in right of His Majesty King George III., by the name of New South Wales, with all the bays, harbours, rivers, and islands situated upon it. We then fired three volleys of small arms, which were answered by the same number from the ship."

Cook's private log thus describes this same ceremony (which

January, 1788, the eastern portion of the continent was proclaimed a British colony, with Captain Phillip as its first Governor. The erection of the Port Phillip District in 1851 and of the Moreton Bay District in 1859 into the colonies of Victoria and Queensland respectively considerably reduced the territorial extent of the colony as laid down in Governor Phillip's commission, and the term New South Wales is now restricted to that portion of Eastern Australia lying east of the 141st meridian, and having a seaboard extending from Point Danger (lat. $28^{\circ} 10'$ S.) to Cape Howe (lat. $37^{\circ} 28'$ S.)

BOUNDARIES AND EXTENT.

New South Wales lies almost entirely between the 29th and 37th parallels of south latitude, and between the 141st and 154th meridians of east longitude. It is bounded on the *North* by QUEENSLAND, on the *South* by VICTORIA, on the *East* by the SOUTH PACIFIC OCEAN,* and on the *West* by SOUTH AUSTRALIA.

took place at Possession Island, close to Cape York, on 22nd August, 1770):—

“A little before sunset I took possession of the country in His Majesty's name, and fired three volleys of small arms on the occasion, which were answered from the ship.”

In the original papers, whether of Cook or of his officers, the name “New South Wales” nowhere occurs; indeed, in two places, Hawkesworth uses the term “New Wales.” As far, therefore, as documentary evidence is concerned, it appears that the name New South Wales originated with Hawkesworth, and possibly this designation was determined upon in England after consultation with Banks and Cook. (See *Historical Records of New South Wales*, vol. i., part i., pp. 78, 169, 170.)

*That portion of the South Pacific Ocean lying between New Zealand and the islands north-west of it on the one hand, and the eastern coasts of Australia and Tasmania on the other, has in recent years received the name of the Tasman Sea. This name has been printed on the Admiralty charts since 1891, and was adopted on the suggestion of the Council of the Australian Association for the Advancement of Science.

The *northern* boundary line in detail runs as follows:— (i.) From Point Danger westward along the Macpherson Range to the junction of the latter with the Great Dividing Range at Wilson's Peak; (ii.) thence along the Great Dividing Range southward till it reaches a spur running westward to the junction of Tenterfield Creek and the Dumaresq River; (iii.) from this point it follows the crest of the last-named spur; and (iv.) is continued successively along the Dumaresq, Macintyre and Barwon Rivers to the 29th parallel of south latitude, and thence along that parallel to its intersection with the 141st meridian. The *southern* boundary has the following course:— (i.) A surveyed (and marked) line from Cape Howe to the source of the river Indi at the foot of Forest Hill, a few miles south of The Pilot (one of the most conspicuous peaks of the Australian Alps); (ii.) thence along the course of the Indi, and afterwards of the Murray,* westward to the 141st meridian.

The *area* of New South Wales is 310,367 square miles. Its *greatest length* measured diagonally from Point Danger to the south-west corner, where the Murray passes into South Australia, is 850 miles; its *breadth* from east to west along the 29th parallel is 760 miles; and its *coastline* is 700 miles.

CAPES.

The coast of New South Wales, is, on the whole, regular and unbroken. It consists of a succession of rugged cliffs and sparkling sandy beaches, broken at frequent intervals by crescent-shaped bays and wide river estuaries. Its general trend is from north-east to south-west, through about four degrees of longitude, from Point Danger, in longitude 154° E. (nearly), to Cape Howe, in

*In 1855, by an Imperial statute, it was enacted that the whole watercourse of the Murray, from its source to the eastern boundary of South Australia, "shall be within the territory of New South Wales."

longitude 150° E. Few capes project into the sea more than a few hundred yards, and the navigation of the coast is rendered very easy by the absence of dangerous reefs and currents, while lighthouses have been erected on all the more prominent headlands.

In the important work of providing the coastline with lighthouses, beacons and other marks for the guidance of the lonely mariner by night, the N.S.W. Government has expended upwards of £280,000, apart from the cost of upkeep. In the near future all Australian lighthouses will be controlled by the Commonwealth Government.

Proceeding from north to south the chief headlands are:—

Point Danger, a rocky promontory standing boldly out into the sea, and forming the most northerly point on the coast. It was so named by Captain Cook on account of the neighbouring shoals, into the vicinity of which he was brought back by the current after sailing beyond them.

A little to the south is the popular holiday resort of Tweed Heads whose fine beach attracts thousands of surf-bathers and other tourists during the summer months.

Fingal Point, near the Tweed River, provided with a fixed white light visible 12 miles.

Cape Byron, a rocky promontory, two miles in length, the most easterly point of Australia. It screens the busy dairying port of Byron Bay from southerly and south-easterly gales. From a distance it looks like an island. It was named after Admiral Byron, grandfather of Lord Byron, the poet.

Evans Head, between Ballina and Shoal Bay. It marks the termination of the Richmond Range.

Clarence Heads, at the mouth of the Clarence River, provided with a fixed light visible 10 miles.

Smoky Cape, near Trial Bay. It was so named by Cook, who saw dense volumes of smoke rising from it as he sailed past. A lighthouse (with a triple-flashing white light visible 27 miles, and a subsidiary red light overlooking the dangerous Fish Rock) stands on Smoky Cape.

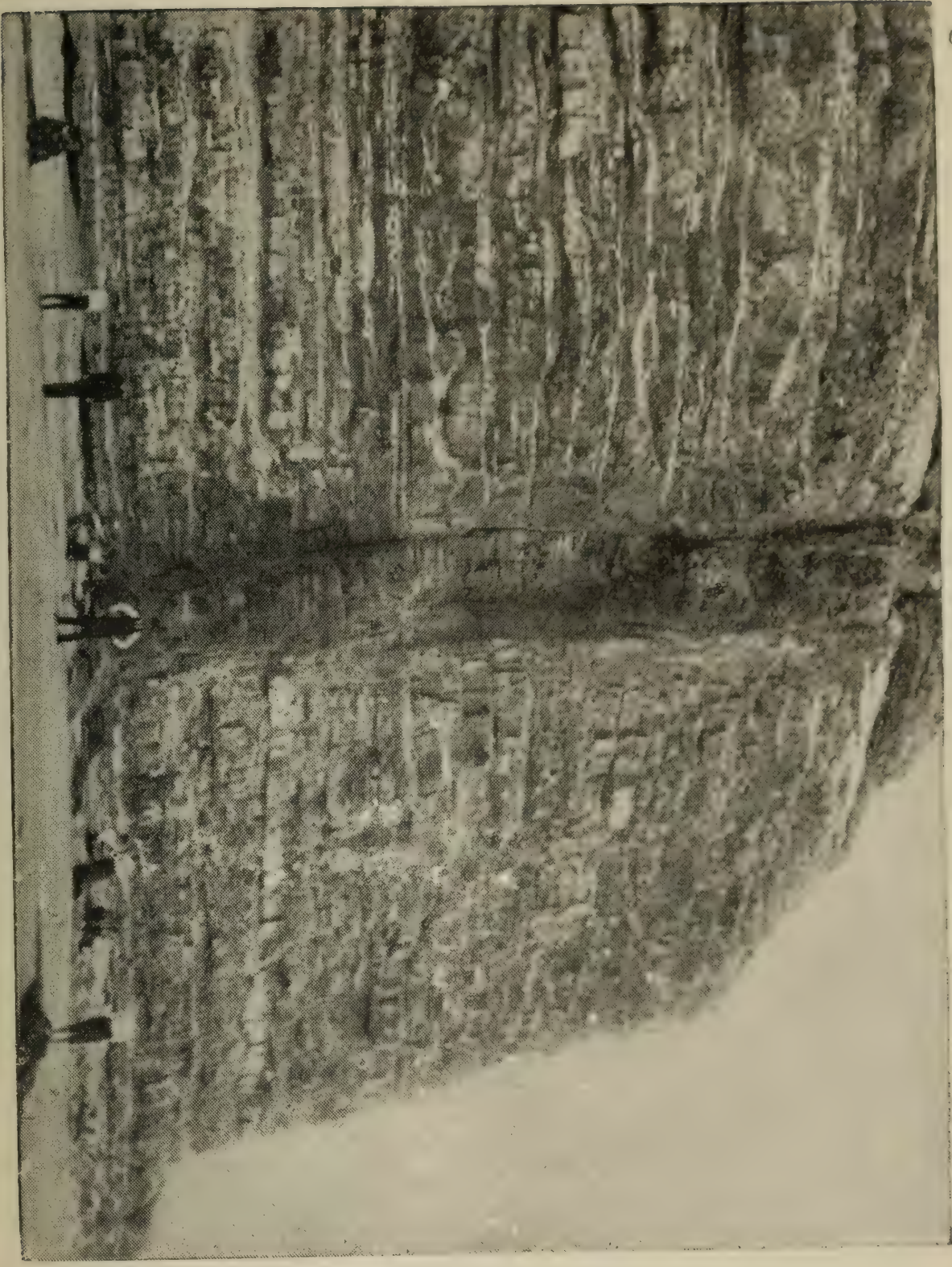


Photo. by Rev. J. Milne Curran. **NOBBYS—NEWCASTLE.**
(Shewing Basaltic Dyke intruding upwards through Coal Measures.)

Korogoro Point, Crescent Head, and Point Plomer, prominent coastal landmarks between Trial Bay and Port Macquarie.

Tacking Point, about two miles south of Port Macquarie, provided with a lighthouse. It was so named by Flinders in 1802.

Indian (or Diamond) Head, near Camden Haven, so named by Cook, because he saw a crowd of blackfellows on it as he sailed by in the *Endeavour*.

Crowdy Head, about eight miles north of the Manning River, and affording shelter for coasters from S.W. and S. winds. It consists of massive grey sandstone more or less horizontally bedded, and is provided with a lighthouse showing red over Mermaid Reef.

Cape Hawke, a bold headland near Wallis Lake, and six miles north of Sugarloaf Point. It was named by Cook in honour of Sir Edward (afterwards Baron) Hawke, First Lord of the Admiralty in the Grafton Administration.

Sugarloaf Point (sometimes called *Seal Rock Point*), near Myall Lake. It has a revolving white light visible 22 miles, with a subsidiary green light over the Seal Rocks.

Point Stephens, at Port Stephens, provided with a revolving red and white light visible 17 miles. On the N.E. headland of Nelson's Bay, close by, there is a lighthouse.

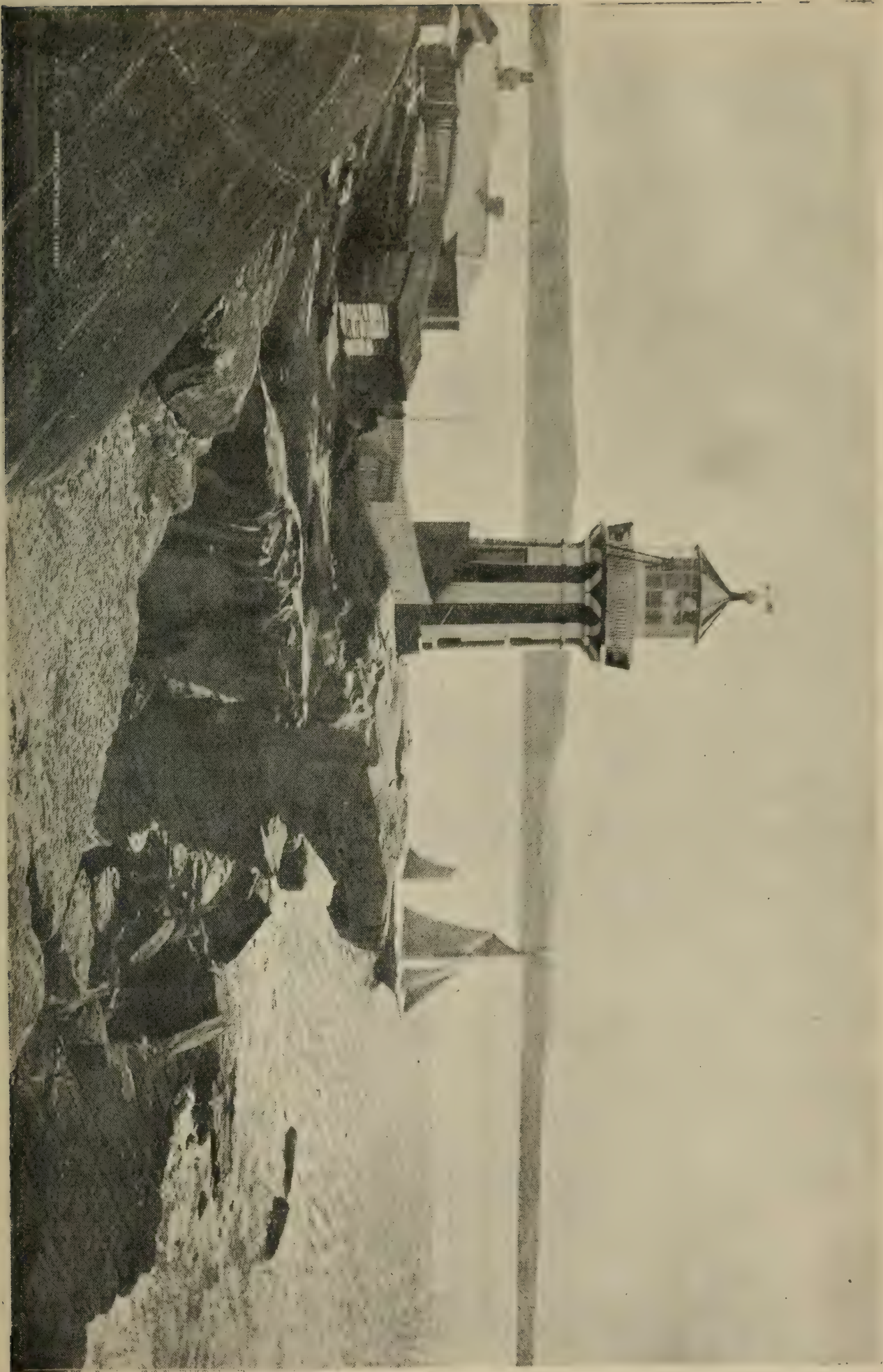
Nobby's (once an island, but now connected with the mainland by a breakwater about half a mile in length) marking the entrance to Newcastle Harbour. On it is a fixed white light visible 18 miles, while red and green lights are placed on the breakwater.

Red Head, a prominent bluff between Newcastle and Lake Macquarie.

Bungaree Norah, near the entrance to the Tuggerah Lakes.

Cape Three Points, so named by Cook, a few miles north of Broken Bay, and the scene of the wreck of the *Maitland* during a violent gale in 1898.

Broken Bay Heads (*Box* or *Hawke Head* on the north and *Barranjoey* on the south), at the entrance to Broken



HORNBY LIGHTHOUSE—SYDNEY HEADS.

Bay, the estuary of the Hawkesbury. On Barranjoey there is a fixed red light visible 15 miles. Nearly equidistant from either head, and at some distance in from the sea, stands Mount Eliot (commonly called Lion Island), a bluff island, resembling the figure of a gigantic lion.

Long Reef, a little to the north of Port Jackson Heads, and close to Narrabeen.

Port Jackson Heads, at the entrance to Sydney Harbour. On the highest part of South Head, overlooking "The Gap," where the *Dunbar* was wrecked in 1857, stands the Macquarie Lighthouse, provided with a fine revolving light, one of the most powerful in the world, and visible over 30 miles at sea. Another lighthouse, the Hornby, with a fixed light, stands on the much lower ground inside South Head at the entrance of the harbour proper.

Cape Banks and *Cape Solander*, the north and south heads respectively of Botany Bay. The former was named after Sir Joseph Banks, who sailed with Cook to Australia, and the latter after Dr. Solander, the botanist of the expedition.

Port Hacking Point, at the southern entrance to Port Hacking.

Coalcliff, rising abruptly from the sea, close to Clifton, and about five miles north of Bulli. It marks the commencement of the Illawarra Range.

Bulli Point and *Bellambi Point*, which shelter on the south the coal-shipping roadsteads of Bulli and Bellambi.

Red Point, a low, bare rocky projection named by Cook, a few miles south of Wollongong. It fronts Big Island (one of the Five Islands group), and is close to Port Kembla.

Point Bass, a long, low cape in the Illawarra district. It lies south of the dairying roadstead of Shellharbour, and a few miles north of Kiama. It was named in honour of George Bass, who, with Matthew Flinders, explored much of the coast south of Sydney.

Black Head, a bluff headland south of Gerringong. It is rich in fossils and is a favourite holiday resort for geological students.

Point Perpendicular, a rocky promontory forming the north head of Jervis Bay. It stands out boldly as a sheer cliff 275 feet high, and on it is erected a lighthouse whose revolving light is visible 20 miles out at sea. Close to the lighthouse is an important signal station.

Cape St. George and *St. George's Head*, rocky promontories immediately south of Jervis Bay. On the heights of Cape St. George stands the Jervis Bay Lighthouse, where a revolving red and green light is visible to sailors 15 miles off. These capes were named by Captain Cook, who passed them on St. George's Day, 1770.

Point Upright, a lofty rocky headland a few miles north of Bateman Bay, described by Cook as "a point of land which rose in a perpendicular cliff."

Moruya Heads, at the mouth of the Moruya River.

Cape Dromedary, between Montague Island and Bermagui.

Tathra Head, at the mouth of the Bega River.

Green Cape (so called by Flinders when he passed it in the schooner *Francis* in 1789), a long promontory south of Twofold Bay, and 15 miles north of Cape Howe. It is provided with a revolving white light visible 19 miles. It was on this headland that the ill-fated *Ly-ee-Moon* was wrecked in 1886.

Cape Howe, the most southerly cape of New South Wales. It was so called by Cook in honour of Viscount Howe, Treasurer of the Navy in the Chatham Administration. The white light of its lighthouse is visible 17 miles.

ISLANDS.

The islands adjacent to New South Wales are few and small. They consist of rugged, weather-beaten rocks, the haunt of numerous sea-fowl, and for the most part lie close to the shore, of which in times past most of them formed a portion. The chief are:—

Cook Island, near Point Danger.

Juan and Julia Islands, about $1\frac{1}{2}$ miles north of Cape Byron.

Solitary Islands, a series of rocky islets between the Bellinger and Clarence Rivers. On the South Solitary the Government has erected, at a cost of £30,000, a splendid lighthouse, the most extensive on the coast.

North Coff's Island, *South Coff's Island*, and *Mutton Bird Island*, near Coff's Harbour.

Seal Rocks, so called from the number of seals found there, a mile and a half to the south-east of Sugarloaf Point.

Broughton Island, the largest on the coast, a few miles north of the heads at Port Stephens. It was named after Captain Broughton of H.M.S. *Providence*, who was driven into Port Stephens by stress of weather, in 1795.

Bird Island, near Tuggerah Lakes.

Five Islands, a group of five small islands a little to the south of Wollongong and close to Port Kembla. Big Island, the largest of the group lies off Red Point, and acts as a shelter for the coal-shipping harbour of Port Kembla against southerly gales.

Montague Island, 18 miles south-east of the Moruya River estuary. It is the site of a lighthouse built of granite found on the island. From this island were obtained the fine granite columns on the Pitt-street side of the Sydney Post Office.

In addition to the above, NORFOLK ISLAND and LORD HOWE ISLAND, although not geographically belonging to New South Wales, have for the purposes of government been attached to it.

Norfolk Island, lies in the Pacific Ocean, about 1,200 miles N.E. of Sydney, and nearly midway between New Zealand and New Caledonia. It is five miles long, $2\frac{1}{2}$ miles broad, and covers an area of about 13 square miles. Its coasts are high and broken, its surface is generally even, but it rises in Mount Pitt to upwards of 1,000 feet above sea-level. The island was discovered by Cook in 1774, and used as a penal settlement by New South Wales almost continuously up to 1856, when it was handed over to the Pitcairn Islanders by the British Government. It possesses

a good climate and fertile soil, which yields bananas, onions, potatoes, and other vegetables, which the inhabitants export, besides supplying passing vessels. The population of the island is about 1,000, and the affairs of the settlement are administered by a resident magistrate appointed by the New South Wales Government.

Lord Howe Island lies in the Pacific Ocean, about 360 miles off the coast of New South Wales, opposite Port Macquarie. It was discovered in 1788 by Lieut. Ball, in H.M.S. *Supply*, when on his way from Port Jackson to found a settlement on Norfolk Island. It is of volcanic origin; is 7 miles long and $1\frac{1}{2}$ miles broad in some places, and has an area of 5 square miles. The coasts rise precipitously from the sea, and *Mt. Gower* in one of its volcanic ridges reaches 2,840 feet in altitude. The soil is rich and the vegetation profuse, and the population numbers about 100. This island is visited four times a year by a magistrate appointed by the New South Wales Government.

INLETS AND HARBOURS.

At intervals along its 700 miles of seaboard New South Wales has some fine natural harbours, one of which, Port Jackson, stands unrivalled for its extent, beauty, and shipping facilities. Three others—Port Stephens, Broken Bay, and Jervis Bay—are little inferior to Port Jackson, while several small ports, estuaries, and roadsteads afford abundant facilities for trade, and are safe harbours of refuge from the perils of the sea. Most of the rivers have sandbars at their mouths, which often make it difficult to enter them; but of late years this evil has been greatly reduced by the operation of powerful Government dredges which are continually at work on different parts of the coast.

Besides this, extensive training walls have been constructed in many places to increase the scouring effect of the tides and the river outflow, and thus bring about the

removal of the bars. At Sydney and Newcastle there are pilot stations, and at the various other ports whale-boats fitted with cork linings are in readiness for rescue work. Shipping disasters are not of frequent occurrence on this coast; those that occur are generally among small craft, larger vessels being rarely wrecked unless they have been carelessly navigated.

Going along the coast from north to south the chief inlets are:—

Byron Bay, sheltered by Cape Byron. It has a large and rapidly growing export trade in butter, dairy produce, and hardwoods. It affords safe anchorage except against north-easterly gales, and is useful as a haven of refuge for vessels trading between Sydney and the Queensland ports. A large pier has been built to facilitate shipping.

Shoal Bay, the estuary of the Clarence River. It is a safe and commodious harbour, although the size of vessels entering it is limited by the depth of water on the sandbar. Chatsworth, Harwood, and Palmer's Islands are situated at the head of the bay.

Coff's Harbour, a busy and rapidly growing timber port a little to the south of the Solitary Islands. Through it passes a large amount of the trade of the thriving farming plateau of the Dorriggo.

Trial Bay, at the mouth of the Macleay River. It affords ample shelter and safe anchorage. A large break-water is in course of construction to provide increased shipping facilities.

Port Macquarie, the estuary of the Hastings River, and a commodious harbour.

Camden Haven, between Port Macquarie and Indian Head.

Crowdy Bay, between Camden Haven and the Manning River.

Harrington and Farquhar Inlets, at the mouth of the Manning River.

Forster Harbour, near Cape Hawke, affording safe anchorage.

Port Stephens, the estuary of the Karnah River. It was named by Cook in honour of Philip Stephens, Secretary to the Admiralty. There is a depth of 30 feet at the entrance, and this can be increased to 40 feet by dredging away the sand. The width between the headlands is three-quarters of a mile, and the navigable width a quarter of a mile. Among Australian ports it is only second to Sydney Harbour, and indeed it has more water with a depth of 30 feet than has Port Jackson. Doubtless as times goes on Port Stephens will be turned to use as a coal port to relieve the shipping congestion at Newcastle. At present, owing to the scanty population in the neighbourhood, its trade is trifling, being confined to the shipping of fish and timber.

Port Hunter (Newcastle Harbour), at the mouth of the Hunter River. It is now a safe and roomy harbour, owing to the extensive breakwaters and training walls that have been constructed, and is also the great coal port of Australia. Two miles of magnificent wharves, provided with steam and hydraulic cranes of the most modern type, line its shores. Powerful dredges are constantly at work deepening and clearing the channels, and vessels drawing 23 feet of water can berth alongside the wharves. Its defence is provided for by powerful batteries at Fort Scratchley (near the entrance to the harbour) and at Shepherd's Hill, which overlooks the Pacific.

Broken Bay, the mouth of the Hawkesbury River. It is 15 miles north of Sydney Heads, and is popularly supposed to have been so named by Cook on account of its wild, broken appearance.* It is an extensive natural

*BROKEN BAY: In Hawkesworth (vol. iii., p. 507) we read that at sunset on 7th May, 1770,

“Some broken land that seemed to form a bay, bore N. 40° W., distant 4 leagues. This bay, which lies in latitude 33° 42', I called Broken Bay.”

The appropriateness of this name as applied to the Hawkesbury mouth is generally admitted. But, as is pointed out by the editor of the *Historical Records of New South Wales*:

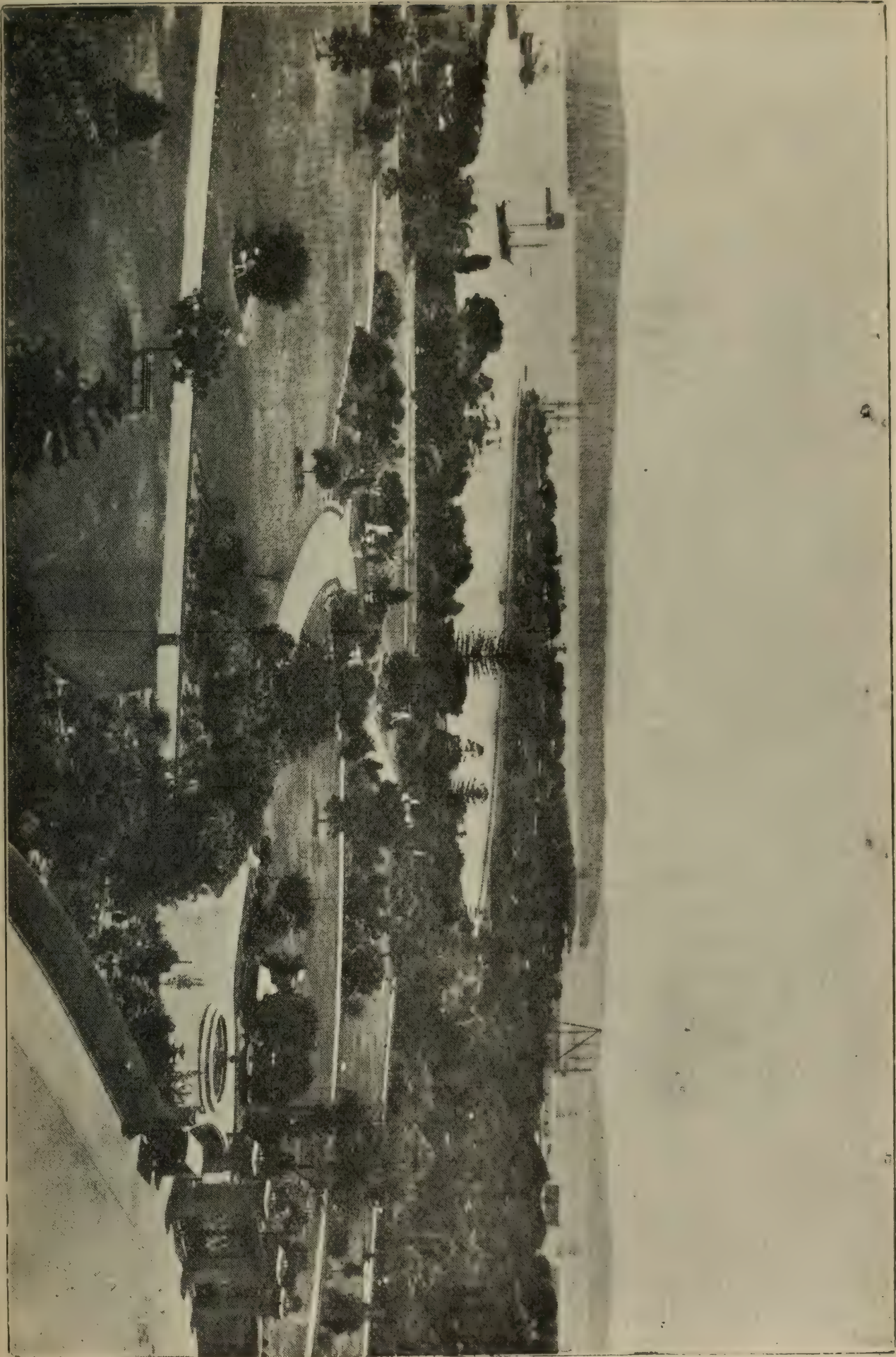
“The rate at which the vessel was travelling, the latitude

harbour, full of beautiful land-locked bays pushing inland for miles between great rugged precipices, which frown upon the deep, still waters at their base. The bay has three large branches, viz.: *Brisbane Water*, the northern; the *Hawkesbury Mouth*, the central; and *Pittwater*, the southern arm. Brisbane Water consists of a series of bays, and at the head of one of them—the Broadwater—stands Gosford, a well-known tourist centre.

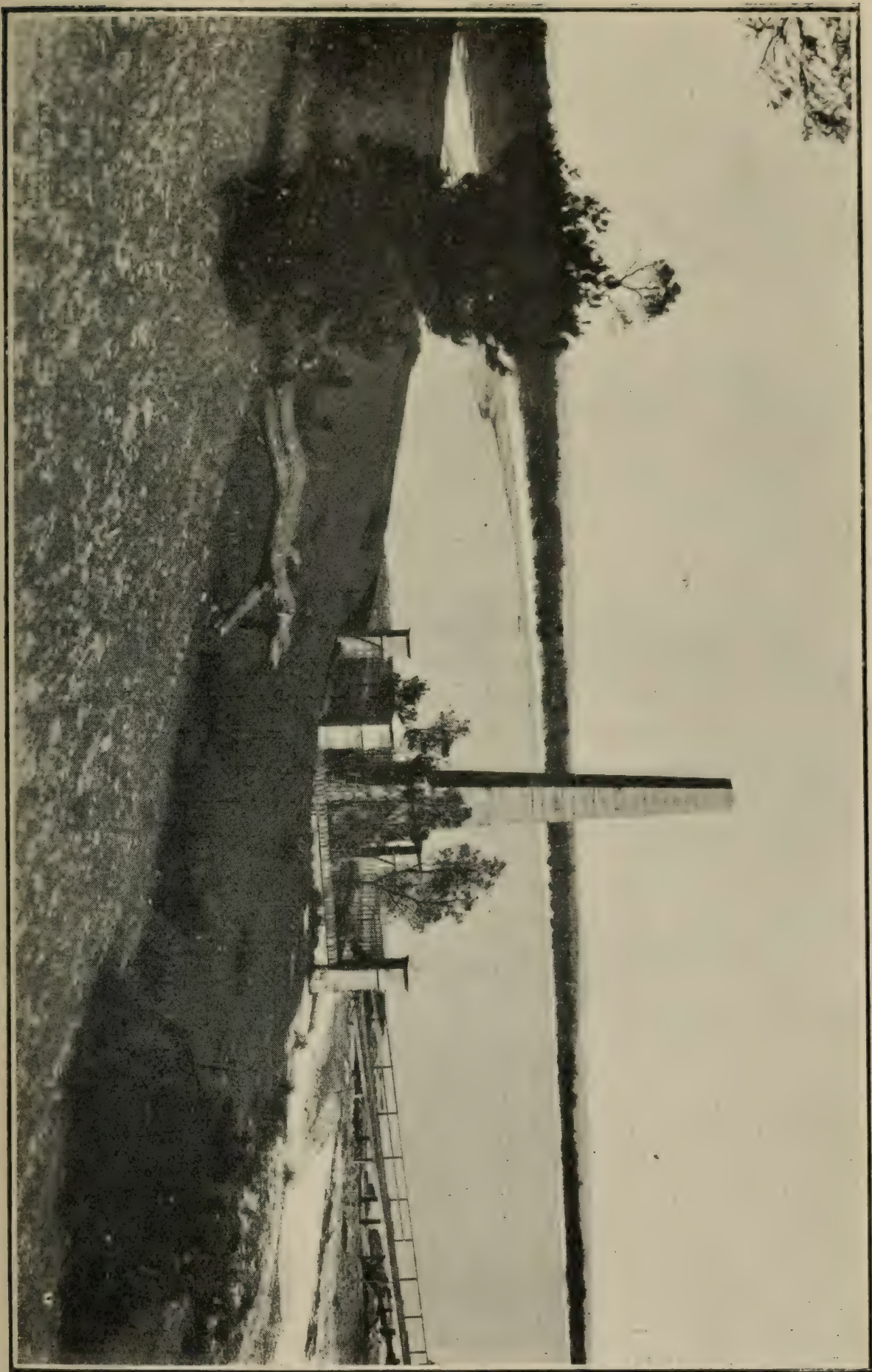
Port Jackson, on the southern shores of which stands the city of Sydney. It is one of the finest harbours in the world. Captain Cook, in 1770, gave Port Jackson its name in honour of Sir George Jackson, the then Secretary to the Lords of the Admiralty. Its entrance is marked by two bold headlands, 74 chains apart, called respectively North Head and South Head. Vessels drawing as much as 34 feet can enter the harbour at low spring tide, and this depth is being increased to 40 feet by dredging. The natural beauties of Sydney Harbour are well known, and in the quiet waters of its numerous bays and coves the navies of the world might securely rest. Port Jackson possesses about 200 miles of water frontage available for wharfage. The chief offshoots of the harbour are *Sydney*

Cook assigned to the bay, and the relative positions of Botany Bay, Port Jackson, and Broken Bay on Cook's chart, all prove conclusively that the broken land Cook saw could not have been more than seven or eight miles north of Port Jackson. Further, when Cook saw this broken land bearing N. 40° W., he was about seven and a half miles from the shore, and not many miles north of Port Jackson. From this position the land at the mouth of the Hawkesbury neither appears broken nor like a bay, and its bearing would be more northerly than that given. From this, and the fact that it would be late at night before the *Endeavour* got abreast of the Hawkesbury, there can be little doubt but that the 'broken land like a bay' was that in the vicinity of Narrabeen Lagoon."

Governor Phillip, who explored the coast district between Port Jackson and the Hawkesbury, evidently took it for granted that the mouth of the latter was Cook's Broken Bay. Flinders was the first to notice that the position of the Hawkesbury mouth did not agree with that assigned to Broken Bay by Cook's chart.



MONUMENT ERECTED ON CAPTAIN COOK'S LANDING PLACE—KUTNELLA, BOTANY BAY.



at Shea's Creek, near Botany, a submerged forest was found at a depth of about 15 feet below the present high water level. Besides the mahogany and other eucalyptus trunks comprising this unearthed forest, the workmen discovered close by, and at a like depth, the skeleton of a dugong (the remains, doubtless, of an old-time blackfellows' feast), as well as several blackfellows' tomahawks. The whole of the dugong bones were in an excellent state of preservation, and were more or less fossilised. The finding of this old-time forest, and the discovery of fresh-water shells and vegetation at a depth of 70 feet during boring operations at Narrabeen, are looked upon as the most important pieces of evidence ever obtained in any part of Australia, to prove land submergence in recent geological times.

Botany Bay, a few miles south of Sydney. It was the first Australian port entered by Captain Cook. In Hawkesworth's edition of Cook's voyages, the great discoverer is made to say, referring to this bay: "The great quantity of plants which Mr. Banks and Dr. Solander collected in this place induced me to give it the name of '*Botany Bay*.'"^{*} It has a wide entrance, and is chiefly made use of as a fishing

^{*}With regard to the origin of the name "*Botany Bay*," there has been much speculation. Dr. Hawkesworth (vol. iii. p. 504) says:—

"The great number of plants which Mr. Banks and Dr. Solander collected in this place induced me [*i.e.*, Captain Cook] to give it the name of *Botany Bay*."

while Cook himself, in his private log, wrote:—

"The great quantity of these sort of fish (stingrays) found in this place occasioned me giving it the name of *Stingray Harbour*."

Cook, again, in his *charts*, uses the name *Botany Bay*. As has been pointed out, "the fact that considerable quantities of stingrays were subsequently caught at other places on the coast, would doubtless incline Cook to adopt a more distinctive and appropriate name;" and this he appears to have done, on his return to England, when overhauling his papers, and probably after discussing the matter with Sir Joseph Banks and his editor, Dr. Hawkesworth. (See *Historical Records of New South Wales*, vol. i., part i., p. 161.)

ground, tourist resort, and harbour of refuge. The water is shallow, and the shores are barren. These causes, together with its nearness to Port Jackson, prevent the shipping trade of the bay from becoming large. On the southern shore of the bay not far from the entrance is Kurnell Beach, where Captain Cook landed in 1770, and where a monument has been erected to his memory; while, almost opposite, on the northern shore, stands the La Perouse monument, erected in honour of the French navigator who visited the bay a few days after Cook's landing. Close by is the village of La Perouse, whence a cable is laid to New Zealand. Near the entrance to Botany Bay is a line of forts forming the southern defence of the metropolis. Cook's and George's Rivers are small streams flowing into Botany Bay.

Port Hacking, a small bay a short distance south of Botany, and a harbour of refuge for small vessels. As a fishing ground is held in high favour by residents of Sydney.

Wollongong and *Kiama Harbours*, in the Illawarra Districts, both small ports that have been "snatched from the sea." They are places of much trade, the former exporting coal chiefly, and the latter dairy produce; but both are difficult of entrance in stormy weather. Fortifications have been erected on the hills overlooking Wollongong Harbour. A few miles south of Wollongong is *Port Kembla*, whence coal and coke are largely shipped, and where extensive smelting works are in operation.

Jervis Bay, a fine expanse of water a little to the south of the Shoalhaven River, with deep water throughout. Fishing is the principal industry, but otherwise the trade of the port is small, owing to the fact that the extensive and thickly-timbered lands skirting it on the west are still undeveloped. The Commonwealth Government has taken over from New South Wales a portion of the foreshores of the bay on which to construct a seaport for the Australian Federal Capital. The main Federal territory is on the southern side of the bay, at what is known as

Darling Road, where there is good anchorage. The entrance to Jervis Bay, between Bowen Island (over which the Commonwealth Government has been granted sovereign rights) and Point Perpendicular, is a mile and three quarters in width.

Wreck Bay, a few miles to the south of Jervis Bay.

Bateman Bay, at the mouth of the Clyde River, probably so named "in honour of Nathaniel Bateman, who was captain of Lord Colville's ship *The Northumberland* at the time when Cook was serving on her as master." It (like the estuaries of the Moruya, Tuross, and Bega Rivers) is a port where steamers load dairy produce for the Sydney market.

Twofold Bay, near the southern boundary of the State, a splendid harbour that may be entered in all weathers. This sheet of water is divided into two well-marked areas by a mass of land which stretches a considerable distance into the bay. From Eden, a town on its shores, dairy produce is shipped to Sydney, and cattle to Melbourne and to Tasmania. It was formerly the headquarters of an extensive ocean whaling trade, but owing to the reduced demand for sperm oil, only a few men are now engaged in the work, and they confine their exertions to whaling in the bay.

Disaster Bay, immediately to the south of Green Cape.

LAGOONS.

At intervals along the coast there are several fairly large sheets of water, locally called "lakes." They are not lakes in the strict sense of the term, for, as a rule, they have communication with the ocean by narrow channels. They are for the most part shallow, and their entrances are nearly all hampered by sand-bars. Some, however, play an important part in the coastal trade, as they can be entered by small cutters, especially after heavy rains, when the pent-up waters break through and sweep away the bars. A great many of these sheets of water were doubtless long ago arms of the sea whose entrances were choked up in

course of time by accumulations of wind-blown sand. The chief of these are:—

Terranora Broadwater (area about 1,000 acres), near Point Danger. It forms part of the western estuary of the Tweed River. It has a depth of five or six feet in places, but parts are dry at low water. Channels six feet deep at low tide and 50 feet wide have been cut through it. These channels are navigable by craft of 50 or 60 tons, and allow sugar cane to be carried in punts to the mill.

Burrawan (or *Lake Innes*), near Tacking Point, and about two miles south of Port Macquarie. Its water is usually fresh, and it has two outlets leading indirectly into the Pacific. One of these leads into *Cathie Lake*, and the other is a creek which joins the Hastings near Port Macquarie. It covers 6,000 acres, but it is not used for navigation, although its depth is sufficient to carry light-draught vessels.

Queen's Lake and *Watson Taylor's Lake*, both tidal waters connected with Camden Haven. *Queen's Lake* covers 2,500 acres, and is a clear sheet of salt water. It is navigable, and is regularly used for punting timber by vessels drawing three to four feet. *Watson Taylor's Lake* covers 3,000 acres. It is noted for its scenery, and abounds in fish.

Wallis Lake, close to Cape Hawke. It receives the waters of the Wollomba River, near the mouth of which are the townships of Forster and Tuncurry, whence fish and dairy produce are shipped to Sydney. It covers 19,000 acres, abounds in fish, and is a popular health and pleasure resort. The entrance is deep enough to allow vessels of fairly large tonnage to enter and ply upon its waters.

Myall Lake and *The Broadwater*, a chain of lakes lying between Cape Hawke and Point Stephens. Their surplus waters drain into Port Stephens by the Myall River (of which in reality they are an expansion). The country surrounding them is richly timbered. *Myall Lake* covers an area of 15,000 acres and is a favourite tourist and fishing resort.

Lake Macquarie, eight miles south of Newcastle. It is a favourite tourist resort and picnic ground, and is the seat of a lucrative fishing trade. Several collieries are worked close to its shores. A few small vessels trade to the lake, which is entered by a difficult opening known as Reid's Mistake. It is 20 miles long and from three to six broad, with a coast line of nearly 200 miles, and an area of 44 square miles. At Boolaroo (near Cockle Creek), on its northern shores are extensive smelting works where ores from various parts of the Commonwealth are treated. Toronto, Belmont, Teralba, and Spier's Point are townships and tourist resorts on the shores of the lake.

Tuggerah Lakes, a favourite fishing and tourist resort, eight miles north of Gosford. They cover an area of over 18,000 acres. The Great Northern Railway passes within two miles of the lakes.

Narrabeen Lake, a small lagoon between Sydney and Broken Bay, and six miles north of Manly. It is much frequented by shooting and fishing parties, while close by are extensive beaches devoted to surfing.

Tom Thumb Lagoon, between Wollongong and Lake Illawarra. It was named after Bass and Flinders' eight foot dinghy, and is often so shallow that it may be crossed on foot.

*Lake Illawarra** (8,000 acres in extent), between Wollongong and Kiama. It yields large quantities of fish for the metropolitan market. The district skirting the lake is devoted chiefly to dairy farming. Except in a few places it does not exceed a few feet in depth.

St. George's Basin (9,000 acres in extent), a little to the south of Jervis Bay.

Conjola Lake (into which Conjola Creek flows), six miles north of Ulladulla.

Lake Burrill, two miles south-west of Ulladulla.

Tuross Lake, at the mouth of the Tuross River, and nine miles south of Moruya Heads.

*A colonist's corruption of *Allouric*, the aboriginal name for the surrounding district.

Wallaga Lake, between the Tuross and Bega Rivers, and two miles north of Bermagui.

Lake Wallagoot, four miles south of Tathra.

Lake Merimbula, one mile north of Panbula, between the Bega River and Twofold Bay.

Lake Pambula, about five miles north of Eden.

SURFACE.

The surface of New South Wales comprises three distinct natural divisions, viz:—(i.) The *Coast District*; (ii.) the *Tablelands*, and (iii.) the *Great Plains*.

The *Coast District* is a strip of undulating well-watered country, lying between the ocean and the eastern flank of the Tablelands. Its average width is about thirty miles.

In the Hunter-Goulburn Valley (its widest portion) it spreads out for a distance of about 150 miles. Between the Hunter and the Colo-Hawkesbury there is much broken country, especially in the part occupied by the tangled ridges forming the Hunter Range.

Near Clifton, the Southern Tableland runs out till it meets the ocean, from which, however, it gradually recedes as it extends southwards. In doing so it skirts on the west the dairy-farming and coal-producing district of Illawarra, a much-frequented tourist resort, remarkable for its grandly-frowning cliffs and creaming beaches, as well as for almost tropical luxuriance of its stately palms, tree-ferns, and other varieties of native vegetation. The soil of the Coast District is, as a rule, fertile, especially along the banks of the numerous streams that water it, and enjoys a regular and sufficient rainfall.

Its rivers are nearly all short, because the Great Dividing Range, in which most of them rise lies so close to the ocean. They are also rapid, the fall being about 70 feet per mile, and during periods of abnormal rainfall many of them overflow and cause great havoc to crops and settlements. Throughout the Coast District many lateral spurs stretch eastward from the Great Dividing Range towards the Pacific, and form watersheds between the coastal rivers.



Copyright Photo.

AN ILLAWARRA SCENE (STANWELL PARK).

Kerry, Sydney.

and the *Southern*—comprise an extensive plateau region. In addition to these, several low but rugged ridges are scattered at intervals throughout the region.

The greater part of the Coast District has been brought under cultivation, and dairy-farming has gradually become the leading industry. In the warm alluvial flats skirting the northern rivers the growth of sugar cane has almost entirely given place to dairying. Maize, sorghum, and lucerne are the chief crops farther south as far as the Hunter; while in the Parramatta and Ryde districts—contiguous to Sydney—oranges, lemons, and stone fruits are extensively grown to supply the local market and also for export. In the parts of the Coast District lying close to the Tablelands the hill slopes are clothed with dense forests of hardwood, while underlying the whole of the coastal area between Port Stephens and the Clyde River and stretching south-west past Moss Vale and westerly under the Blue Mountains to Lithgow, occurs one of the world's greatest coalfields.

The presence of these magnificent coal deposits unmistakably marks out this part of New South Wales as the great future manufacturing area of Australia, with Sydney as its natural centre. In the Clarence-Richmond district in the north there are valuable coal seams also, but they are as yet unworked on account of their distance from rail or seaport.

The indigenous vegetation of the coast is, as a rule, varied and luxuriant, but with the march of settlement, it is necessarily giving place by degrees to pasture grasses. Over wide areas, especially in the deep gullies near the heads of the various coastal rivers, and in the neighbourhood of numerous old-time basaltic overflows, the hill slopes are clothed with a luxuriant semi-tropical natural drapery, stately palms and tree-ferns, acacias, gums, banksias and fig-trees uniting to form a picture charming not only to the tourist and botanist, but even to the practical and prosaic searcher after rich farming lands.

The Tablelands, of which there are two—the *Northern*

extending, with only one break, along the eastern side of the State, at an average distance of about 30 miles from the ocean. They form portion of a more extensive series of uplands varying from 30 to 100 miles in width, lying between North Queensland and the south-east portion of Victoria, and serve as a basement for the Great Dividing Range, which, with a few breaks, runs along them from north to south. They are furrowed in many parts by deep and rugged valleys, and as a rule they present on the eastern side a steep escarpment towards the ocean; while to the interior plains, from which their line of separation is by no means so clearly defined, their slope is long and comparatively gentle. These Tablelands resemble each other in general appearance and average height. In addition, they slope towards one another, their highest portions consequently being near the Queensland and Victorian borders respectively. The Liverpool Range and a portion of the Main Range further south serve as a connecting link between them. Centuries ago these Tablelands, in all probability, formed one continuous plateau. Owing, however, to the long-continued action of running water, they are now distinct, the Hunter-Goulburn and Peel Valleys having gradually been eaten into the old plateau right back to the Great Dividing Range.

Both Tablelands are traversed from north to south by railways, and in the course of a train journey on either of them, delightfully varying landscapes are met with. In some cases the mountains consist of sandstone strata, monotonous in their regularity, in others of wild granite masses in all stages of weathering. At intervals a sudden change to a luxuriant vegetation indicates the presence of decomposing basalt, every sheet of which is an ancient lava stream, pointing to a time when volcanic fires smirched the hillsides of this part of Australia, while their escaping gases and ashes darkened the air. The decomposing products of these old-time outflows have been responsible for the marvellously rich patches now met with, for example, in the New England District, along the eastern and

The diagram illustrates the profile of the Andes Mountains. The horizontal axis at the top represents the distance from Sydney in miles, with markings at 30, 40, 50, 70, 90, 100, 120, 140, 160, 170, 190, 220, 250, and 280. The vertical axis on the left represents altitude in feet, with markings at 1000, 2000, 3000, and 4000. The mountain profile is shown as a dark silhouette against a grid background. The highest peak is located between 100 and 120 miles from Sydney, reaching an altitude of approximately 4000 feet. The terrain is rugged with several smaller peaks and valleys.



western flanks of both Tablelands, and even farther away in the Gwydir-Namoi black soil plains, which render trying and difficult the task of teamsters crossing them in wet weather, with heavily laden wool and grain waggons from the sheep-runs and wheat fields of the north-west. The granite country of the tablelands has been proved excellently adapted for growing apples, pears, and stone fruits. It has also shown itself to be good wheat and sheep country. It becomes richer in lime and potash with depth; its main defect, however, is want of organic matter, and success in the cultivation of granite soil will depend mainly on the attention paid to keeping up the supply of humus.

The *Northern Tableland* commences in Queensland, and slopes gradually towards the south till it terminates at the northern side of the Peel River Valley. Its average height is about 2,500 feet. Its course is parallel to the coast, and on its highest shoulders rest the so-called New England Range and part of the Macpherson Range. On the eastern side the North Coast Rivers (Richmond to Manning), fed by a regular and heavy rainfall, have cut deeply into the escarpment and find their way almost straight to the sea between the lower spurs. On the west and south-west a line from Inverell to Manilla, and thence to Moonbi,* may be taken roughly as the boundary between the Northern Tableland and the Great Plains. The Great Northern Railway from Sydney to the Queensland border runs in a generally northern direction along this Tableland, passing through the chief centres of population and trade. The climate is, on the whole, bracing and genial, although the winters are sometimes very severe. Cereals, fruits, and dairy produce are largely raised, and several gold diggings and tin, silver, and antimony mines are worked.

Various parts of the region bear distinctive names, *e.g.*,

*Between Manilla-Moonbi and Wellington-Gulgong-Mudgee there is no tableland.

RELIEF MAP OF AUSTRALIA.



The Dorrigo, watered by the Guy Fawkes and Nymboida Rivers, and forming the elevated hinterland of the coastal tract around Coff's Harbour; *Barney Downs* (east of Tenterfield); the *Beardy Plains* (near Glen Innes); the *Salisbury Plains* (between Uralla and Armidale); and the *Byron Plains* (north of Inverell). Huge granite bosses and dykes of various types and ages are widely distributed throughout the Northern Tableland, and to their presence the New England district especially owes its wealth of tin, wolfram, molybdenite and bismuth; while to another class of rocks are due the various gold-silver, gold-copper, silver-lead, and probably the tin deposits of this productive region.

The *Southern Tableland* is bounded on the north by the Cudgegong and the Colo Rivers, the former being the northern limit of the portion west of the Great Dividing Range, and the latter of the part east of it. Going south it increases in height, and at length passes into Victoria. On examining that portion of the Tableland on the coast side of the Great Dividing Range, it may be seen that (i.) immediately south of the Colo a large section—the Blue Mountains—is almost cut off by Cox's River from the main body lying further south; (ii.) a line from Rydal to Clifton forms roughly the northern boundary of this southern section; (iii.) the latter remains more or less intact, because the big rivers (Wollondilly and Shoalhaven) which cut through it run from south to north, and so do not interfere with its seaward face; (iv.) from Clifton southwards the eastern edge, while gradually trending inland, is distant only a few miles from the coast (with the Lower Shoalhaven as its only serious interruption) till it reaches a point west of Bega, beyond which it works inland and crosses the Victorian border; and (v.) the Illawarra and Currockbilly Ranges fringe it on the east, the latter rising considerably above its general level, while the former is little more than its seaward edge.

With regard to the portion lying west of the Dividing Range, it may be seen that (i.) unlike the corresponding

portion of the Northern Tableland, it falls by two well-marked steps instead of one towards the western plains; (ii.) its inner edge may be indicated approximately by a line from Orange to Yass, while the outer runs from Wellington to Gundagai *via* Parkes, Cowra, Young, and Cootamundra; and (iii.) south of the Murrumbidgee it spreads out again as a series of tangled ranges to about the meridian of $147\frac{1}{2}^{\circ}$ east. The average height of the Southern Tableland is somewhat less than that of the Northern, notwithstanding the presence within its limit of the Kosciusko Plateau, the most elevated portion of the State. Its surface varies considerably, being wild and broken in some parts, while in others it is level and park-like, especially in places remote from the Great Dividing Range. Level upland plains like those of the Northern Tableland occur on this also, the chief of them being the *Bathurst, Goulburn, Yass, and Monaro Plains*, all of which are devoted in the main to sheep-farming, dairying, and fruit-growing. A prominent feature of the Southern Tableland is the number of "sunken valleys" which are met with within its limits.

These, like the cañons of the United States, are vast gorges that have been hollowed out in the course of ages by running water to the depth, in many cases, of more than 2,000 feet, the cliffs that bound them being sometimes fully 600 feet in the sheer. Among the more notable of these are the valleys on the Blue Mountains, within easy reach of Sydney; *Burraborang Valley*, through which the Wollondilly flows; *Kangaroo Valley*, between Moss Vale and the Shoalhaven; and the *Araluen Valley*, about 15 miles southwest of Braidwood. Within the Southern Tablelands also are situated the far-famed *Jenolan, Wombeyan*,* and

*All these caves are formed in coral reefs or atolls of Silurian age. Writing on the geology of the Wombeyan Caves, Professor David remarks:—

"The belt of limestone in which the caves occur is estimated to be two and a half miles long by one mile wide. . . . [Their] fossils show that the limestone bed is an old coral reef of Palæozoic age. Buried beneath massive accumulations of clay, sand, and quartz-pebble conglomerates, and subjected for vast

Yarrangobilly limestone caves. Towards its southern extremity this tableland becomes wild and broken, and close to the Victorian border occurs the Kosciusko Plateau, often referred to as the "Roof of Australia."

The climate of the Southern Tableland is, on the whole, mild and bracing, and in summer its numerous health and tourist resorts are thronged with visitors.

THE GREAT PLAINS.

The whole of the interior of the State of New South Wales, from the base of the Tablelands to its western boundary, is occupied by huge plains—a land of the golden fleece and golden grain. These vast tracts, although sloping gently towards the bed of the Darling.

periods of time to intense heat and pressure, nearly all traces of the original organic structure of the corals and shells have been obliterated, and the whole atoll has been converted into a bed of more or less crystalline limestone. The whole of these sedimentary strata, with the underlying limestone bed, have subsequently been slowly raised above the sea-level by those oscillations of the earth's crust, which, as geology shows, have prevailed throughout all the past of which we have any record, and are even now in progress. Exposed to the denuding influences of air and water, the overlying rocks have been worn down until, at last, at a point far inland, the fossil coral reef, now changed into limestone, is again laid bare. Then commences the process of cave making. The lime dissolved out by the acidulated water [in this case water holding carbonic acid in solution] in the course of the formation of caves is partly deposited in the beautiful and fantastic forms of stalactites and dripstones, but chiefly carried away in solution down the Wombeyan Creek into the Wollondilly River, on to the Nepean and Hawkesbury, and so out to sea at Broken Bay. Arrived in the waters of the Pacific, it is partly absorbed by fish, crustacea, shellfish, and tiny organisms on our own coasts, and partly carried southwards by the East Australian Current, and northwards into water warm enough to support the life of the coral polyp, as at Lord Howe Island. Here it is taken up by the polyp and converted into beautiful coralline structures. Thus history repeats itself, and the coral polyps of to-day construct their strong skeletons out of the material which formed the bones of their Silurian ancestors."

are, over wide areas, almost as level as a cricket pitch, and for the most part destitute of heavy timber except near the river banks. Trifling elevations and small belts of scrub-land occur indeed, but only at distant intervals, and with the exception of the Grey and Barrier Ranges, near the western boundary of the State, the only elevation deserving of mention is a line of elevated country that extends between Orange and Cobar, and serves as a watershed between some of the tributaries of the Lachlan and the Darling. This ridge is supposed to be the ruined remnant of an old range of mountains, which in ages long since past extended as far as the Grey and Barrier Ranges, but which has been cut through by the Darling River and worn down to its present insignificant height by the action of wind and weather. The drainage system of the Great Plains, as represented on the map, conveys a by no means accurate idea of the actual condition of things. One would imagine on examining an ordinary map that a vast network of mighty streams forming the Darling-Murray system drained the whole region, and carried fertility at all seasons through the length and breadth of these vast level tracts. Such is the case only in specially favourable seasons. In winter, as a rule, and in periods of exceptionally heavy rainfall, this state of things does exist, and it is only at such times that all the tributaries of the Darling reach the parent stream. In the summer months usually, and in periods of drought, the great tributary streams shrink to a succession of mere waterholes, and the Darling itself becomes so reduced in dimensions that its navigation has to be abandoned till the rains set in again. If, on the other hand, the rainfall be excessive, the rivers of the Great Plains overflow and flood the comparatively flat surrounding country for miles. It was during one of these wet seasons that Oxley, on sailing down the Lachlan in 1817, and the Macquarie in 1819, was confronted by what appeared to him to be a vast inland sea. Indeed, the Great Plains as they exist to-day are a result of a succession of mighty floods that must have occurred in centuries long

since past. Ages ago the waters of an extensive inland sea covered the greater part of the region now occupied by the Great Plains and connected the Gulf of Carpentaria with the Southern Ocean.

In several parts of the interior special names have been given to different portions of the Plains. The chief of these are the *Liverpool Plains* (a sheep-farming and agricultural tract between the Liverpool and Peel Ranges, discovered by Allan Cunningham in 1825), and *Riverina* (a sheep, fruit, wheat, and wine raising region, intersected by a network of streams, and stretching from the banks of the Murray northwards, with no well-defined limit, beyond the Murrumbidgee). In addition to these there are the *Old Man Plain*, between Hay and Deniliquin; *The Bland*, between Cootamundra and Lake Cowal; *Bulloo Plain*, between the River Paroo and the Grey and Barrier Ranges; and the *Pilliga Scrub* (between Narrabri and Coonabara-bran), which is to be cleared for wheat growing and closer settlement areas. The soil of the plains consists almost entirely of alluvial deposits carried down from the tablelands. It is found admirably adapted for sheep-farming, but the area formerly occupied for this purpose is rapidly being reduced, owing to the extension of the "wheat belt," which is year by year extending westward towards and, in many cases far beyond, the 20 inch rainfall limit.

Visitors to the National Art Gallery in Sydney may have noticed a fine picture by G. W. Lambert entitled "Across the Black-Soil Plains," and wondered at the desperate striving of the horses in their endeavours to keep the waggons moving. These plains occupy large areas, varying from a few hundred yards to several miles across, along the upper middle courses of the Castlereagh, Namoi, and Gwydir. They are flanked by gravelly ridges, punctured with curiously-shaped hummocks, the drainage of which in the course of years has brought into existence these mud lakes. The Black Soil Plains are at present mostly used for grazing, but the loamy parts are beginning to be cultivated

for wheat. With irrigation, corn, oats, and vegetables can be grown, while barley and lucerne should do well on the less clayey portion. Up to the present large areas of these plains have been abandoned to the thistle and the tussock. "Situated as they are," says one observer, "in the Great North-west, where the limited rainfall comes at long intervals, these mud lakes are, for the most part, dry level beds, that become as hard as slate, at times leaving cracks in which one could hide himself. This dryness makes travelling across them easy and pleasant—the more traffic upon the track the more smoothly the vehicle runs. Hence, though the way be wide, and the choice of roads unlimited, all traffic keeps to the same wheel mark, allowing the thistles (with stalks as thick as your arm, and heads as high as yours when on horseback), to occupy all the plain except the track right up to the hub. . . Then comes a shower, a half-inch of rain is recorded, and those who know keep off the Black Soil. . . Sometimes a thunderstorm will pass over, watering a strip of the Black Soil track for a few miles. At the first revolution over this the cycle fork fills with mud, the wheels refuse to go round, even to be trundled along, and the machine must be carried, with all its additional weight of mud, while the cyclist walks with an immense weight hanging to each shoe. . . Wet or dry, His Majesty's mails must go through in all weathers; even though they are sometimes 12 hours behind in a six-hours run, the time being taken up with flogging the horses, seraping the wheels, and waiting for the roads to dry. . . Black Soil mud is not like common mud, which would fall off the wheels with its own weight; it accumulates like snow when it is rolled. Traveling on it is like a fly going through a pot of liquid glue."

In favourable seasons the Great Plains are clothed for the most part with rich natural grasses, on which millions of sheep are depastured, and even in dry seasons the salt bush, a shrub noted as well for its nutritive as for its drought-resisting qualities, is found to be a valuable food for sheep. In addition to this, large quantities of wheat are grown, and

the satisfactory results that have attended the working of the Government irrigation farms in connection with some of the artesian wells of the west show that with a sufficient water supply, the soil of the plains is well adapted for the growth of fruit and vegetables. From childhood all of us have heard and read of the marvellous fertility of the Nile Valley in Egypt, whose productiveness is entirely due to the alluvial deposits that have in the course of ages been spread over its surface. For the same reason our interior plains, formed under like conditions, are equally fertile naturally; but Egypt has the good fortune to be visited by regular floods, whereas the plains of western New South Wales are but rarely inundated. Besides, the deepest alluvial deposits of the Nile Valley do not extend downwards more than 50 feet deep, whereas the alluvial soil of the Great Plains of New South Wales has been proved over wide areas to be many hundred feet in depth. One has but to visit the Government irrigation farms carried on in conjunction with the Pera and Native Dog artesian bores in the Bourke district to become aware of the great agricultural possibilities of the region west of the tablelands, under dry-farming or scientific irrigation. Water alone is wanted to make it in the highest degree productive.

Near the north-western and western frontiers of the State occur the Grey Range and Barrier Range, the former a gold-mining centre and the latter (which rises with singular abruptness from the surrounding plains) the site of the most extensive and productive silver-lead mines in the world. Besides, the Great Plains can boast of the possession of the very rich copper mines at Cobar, while the White Cliffs opal field, in the Wilcannia district, yields some of the finest noble opal as yet found anywhere.

The climate of the plains is hot in summer, although there is an absence of the depressing mugginess sometimes experienced at that time on the coast, and the winters are enjoyable.

Throughout the Great Plains numerous artesian bores have been sunk by the Government and by the squatters,

and the yield of water from them is upwards of 60 million gallons daily. The waters of these bores are largely used both for watering stock and for irrigation. The presence of these wells, and of numerous dams constructed by the Government along the most important stock routes, enables cattle and sheep to be driven and wool and other station products to be carried, even in the driest season, with comparative ease and safety to the railway centres for despatch to the ports on the seaboard.

MOUNTAINS.

THE DIVIDING RANGE.

A generally well-defined range of mountains stretches along the whole eastern portion of Australia from Northern Queensland to Wilson's Promontory in the extreme south of the continent.

The portion lying within New South Wales is known as the Dividing Range, or Great Divide. Proceeding from north to south it has, for convenience, been subdivided into the following eight portions* :—

1. That PORTION OF THE MACPHERSON RANGE† between *Wilson's Peak*, on the Queensland border, and *Bald Rock*, a prominent elevation 15 miles north of Tenterfield.

2. THE NEW ENGLAND RANGE (so called), extending from *Bald Rock* as far as the parallel of Port Macquarie. It is by no means a continuous chain, but is for the most part just the water parting between the easterly and westerly flowing streams of this part of the State. It rises but little above the general level of the plateau, except in the case of its highest peaks—*Ben Lomond* and *Capoom-peta*, each of which rise 5,000 feet above sea-level. The former is an extensive mountain mass, whence several short spurs radiate, and numerous streams, western and coastal.

*These divisions are purely artificial, as there are no gaps indicating where one range ends and the next begins.

† This nomenclature is taken from the standard map of the State, compiled by the Survey Department.

largely draw their waters. The Great Northern Railway passes within about 500 feet of the top of the prominence which forms the summit of the Ben Lomond Plateau.

3. THE LIVERPOOL RANGE, commencing at the termination of the New England Range, runs westerly for about 150 miles, and terminates about 20 miles north-east of Cassilis. It serves as a boundary between the Liverpool Plains and the Hunter-Goulburn Valley, and as a part of the connecting link between the two tablelands. It is rugged throughout, and reaches its greatest height in *Oxley's Peak* (4,500 feet), named after John Oxley, one of Australia's earliest inland explorers.

The more prominent of the remaining peaks are *Mount Temi* and *Mount Tinagroo*. From the latter, which is eight miles S.W. of Murrurundi, a spur branches off in an E.S.E. direction to the Black Mountain (3,297 feet), eight miles N.E. of Scone. In this offshoot are *Mount Wingen*, a well-known burning mountain, due to fires in the underlying coal seams, and *Mount Murrulla*, a prominent peak three miles from Murrurundi. Within the Liverpool Range several noted landmarks are met with, the most important being the Gap of Murrurundi, while in a westerly offshoot, which eventually becomes known as the Warrumbungle Range, is *Pandora Pass** which leads into the Liverpool Plains. A few miles beyond Murrurundi, and at a height of 1,500 feet above sea-level, the range is pierced by an important tunnel belonging to the Great Northern Railway.

[MOUNT WINGEN.—In a spur of the Liverpool Range, about ten miles from Scone and two miles from the Wingen railway station, there stands, at the height of 1,000 feet above sea-level, one of the natural curiosities of Australia. This is Mount Wingen, a burning mountain, and the solitary example of its kind on the continent. Its fires are not volcanic, but result from the gradual but continual burning

*Known locally as Brennan's Gap. It was first explored and named by Allan Cunningham.

of a thick bed of coal—the Greta seam—some distance underground. A thin wreath of smoke and bluish vapour may be seen overhanging the spot and issuing from an area 100 yards wide and extending a distance of about three miles between the “Big” and “Little” Burning Mountains at Wingen. The “Big” Burning Mountain occupies an area of about half an acre, and presents the appearance of a gigantic lime-kiln. Here the subterranean fires rage fiercely, and the surface rocks are everywhere broken and bleached, and in places almost red-hot. From the clefts in this burning area there issue large quantities of smoke and the vapours of several sulphur compounds, which, when they condense, deposit a beautiful lemon-yellow coating over the surrounding rock-surfaces. The same appearances are found at the “Little” Burning Mountain, but are developed on a much less extensive scale. It has been estimated that the burning at Mount Wingen has been going on for at least 800 years, and in all probability it originated in bush fires. The sulphur compounds deposited at the mountain were at one time collected and sold as a remedy for cuts and galls, but this branch of colonial industry has long since been abandoned. Mount Wingen attracts great numbers of tourists annually, and it is one of the most prominent places of interest presented to the view of passengers by the Great Northern Railway Line as the train slowly climbs the hill-slopes above Scone.]

4. THE MAIN RANGE†—From the western end of the Liverpool Range, this portion of the Great Dividing Range takes an almost semicircular sweep around the upper basin of the Hunter-Goulburn as far as *Mount Corricudgy*, whence the Hunter Range branches off to the east. Thence it runs westerly to within a short distance of Ilford, on the Wallerawang-Mudgee line, and afterwards southerly, passing Capertee and Rydal, and at length terminates near Lake Burra Burra, six miles north-west of Taralga. Its

† The name *Blue Mountain Range* given on some maps to this portion of the Great Dividing Range is not used locally, neither is it recognised by the Survey Department.

average height is less than that of its principal offshoots. The point where the Cassilis road crosses this range has the distinction of being the lowest portion of the whole Dividing Range.

It reaches its greatest height in *Mount Binda* (4,460 feet), a prominent peak between Rydal and the Jenolan Caves. In addition to this, the chief elevations are *Tayan Pic* (4,000 feet), 12 miles south-west of Corricudgy, and *Shooter's Hill*, close to which the Macquarie Range branches off to the West. The Great Western Railway crosses the range at Rydal, and the branch line to Mudgee passes along and over it further north.

5. THE CULLARIN RANGE, extending from Lake Burra Burra to the southern end of Lake George, whose waters occupy portion of a depression in the chain called the Lake George Basin. The average height of the Cullarin Range is about 2,500 feet, and its highest peak is *Mount McAlister*, 3,390 feet high, six miles south-west of Taralga. Other prominent peaks are:—*Mount Fitton* (3,107 feet), *Mount Strathaird* (3,012 feet), and *Mount Cullarin* (2,947 feet). This range rises in places into rugged, precipitous cliffs, but consists for the most part of gently-sloping uplands, clothed with forests of stunted gum trees. It is crossed by the Great Southern Railway about 20 miles from Goulburn. Two important rivers—the Hawkesbury and the Lachlan—take their rise in the Cullarin Range.

6. THE GOUROCK (OR SAND HILLS) RANGE, a very rugged mountain chain, running south from Lake George to about the head of the Kybayan River, in latitude $36\frac{1}{2}^{\circ}$ S. For some distance south of the Araluen Valley it forms the edge of the Southern Tableland. Its highest peak is *Tumanmang* (4,656 feet), and the chief remaining elevations in the range are *Jindulian* (4,300 feet), and *Talerang Pic* (4,134 feet). Almost the whole of the Gourock Range region is occupied by settlers (with small holdings), who carry on mixed farming, and, as a rule, spend portion of every year in sheep shearing on the stations of the interior plains.

7. THE MONARO RANGE, stretching from the Gourock Range first southward for a short distance and then suddenly turning to the west and north-west to the neighbourhood of Kiandra. This range encloses on the south the rich sheep and cattle-raising region called the Monaro Plains. Its highest peak is the *Head of Kybeyan River* (4,010 feet), while *Hudson's Peak*, *The Twins*, and *The Queen Gallery* are the more prominent remaining elevations.

8. THE MUNIONG* RANGE, extending from the Monaro Range into Victoria, where it is continued under the name of the Australian Alps. It was called "*Muniong*" by the late Rev. W. B. Clarke, who geologically examined the Kosciusko region in the year 1882. The most southern portion of the Muniong Range in New South Wales is now frequently referred to as the Snowy Mountains. The Muniong Range is the highest portion of the Great Dividing Range, its average elevation being about 6,000 feet. The highest peak of the range is *Mount Kosciusko* (7,328 feet), the highest mountain in Australia. It is almost wholly composed of gneissic granite, although belts of slate and patches of basalt are met with on its slopes. *Mount Townsend*† (also called *Mueller's Peak*), another peak belonging to the Kosciusko group, attains a height of 7,238 feet, while *Ram's Head* and *The Pilot* are respectively 6,600

*A corruption of *Munyang*, the aboriginal word for the large eatable mountain moths, found in great numbers in this locality at particular seasons. In the far-off times when the blacks held undisputed sway over these parts it was their custom for whole tribes—blackfellows, gins, and piccanninnies—to gather together on these uplands, especially after periods of drought—to feed on these moths and at the same time to enjoy the bracing climate. After a couple of months of luxurious living in this way, they returned, fat, glossy, and recuperated to their usual haunts on the foothills and plains to the westward, till the season came round again for their next visit.

†So named in honour of a former Deputy Surveyor-General of New South Wales, T. S. Townsend. In 1846 he ran a traverse line along the main dividing line between the waters of the Snowy and the Murray.

and 6,020 feet in altitude. *Mount Twyman* (about 7,200 feet), *David Peak*, *Etheridge Peak*, *The Perisher*, and *The Paralyser*, are also prominent elevations in the Snowy Mountains.

The Kosciusko region is the coldest portion of Australia. This circumstance and the admirable accommodation and travelling facilities provided by the Government attract large hosts of tourists to these highlands throughout the summer months. For six months of the year snow may be seen on the high peaks of the Muncing Range, and although Kosciusko falls short of the snow line by about 700 feet, yet snowdrifts are often to be met with, and tourist parties have been shut in for days near its summit, even in the middle of summer. The striated rock masses, and the accumulations of moraine matter met with on various parts of the Kosciusko region, show that ages ago huge glaciers filled these upland valleys and helped to sculpture the mountain into the shape it bears to-day.

Between 1889 and 1893 Richard Helms visited the region and found definite traces of glaciation in the form of moraines. His conclusions were disputed by other observers, but in 1901, Professor David and Mr. E. F. Pittman, the leading geologists of the State, critically examined a portion of the Kosciusko Plateau and found such evidence of past ice action (*e.g.*, a terminal moraine flanking the *Hedley Tarn* on the south), as places the former existence of glacial ice at Kosciusko beyond dispute.

The name Kosciusko, now given to the highest elevation of the plateau, is due to Count Strzelecki, a Polish scientist and explorer, who ascended and explored the surrounding region in 1840. To his eyes, the crest of the peak he climbed bore a striking resemblance to the tumulus erected at Cracow over the remains of his fellow countryman, the patriot Kosciusko. This hoary weather-beaten crag is probably one of the oldest land surfaces in the world, and grand as it is to-day, in times long since past it must have been incomparably grander. It is now, indeed, but the abraded stump of a much higher mountain, that in ages



Copyright Photo.

A SNOW DRIFT ON MOUNT KOSCIUSKO.

Kerry, Sydney.

past was flanked with glaciers, while volcanic fires smirched its sides and lit up the adjacent landscape. It was standing high and dry in the full strength of mountainhood when in recent geological time a deep sea extended through Central Australia, and washed against the present foothills of Eastern Australia, when Tasmania was still joined to the mainland, and when thousands of feet of deep blue waters covered the rugged shoulders of the Alps and Himalayas.

Tourist trips to Kosciusko and the Snowy Mountains have now become quite common. The road lies from Cooma to the township of Jindabyne, and thence to the top of the mountain, and throughout the whole journey of 60 miles from the railway terminus there is no Alpine climbing to be done—indeed, a person may drive almost to the top of Kosciusko. When this point is reached the outlook is one of almost unexampled magnificence.

“Nothing in the State,” writes one visitor, “exceeds the panoramic grandeur of the view that awaits the traveller’s ascent. To say that it repays him for his trouble is but a poor compliment to the scenery. Looking northward, he peers down into the valley of the Snowy River; southward, the panorama extends beyond the boundary of the State, far into the Gippsland district of Victoria. Away to the east stretch the Monaro Plains, with the coastal ranges in the distance, and, best of all, to the west, cradled between high mountain ranges, slumbers the peaceful valley of the Murray.” The Kosciusko Plateau has on the whole a comparatively gentle slope towards the east, while on its western side the descent into the Murray Valley is wildly rugged and precipitous. On the slopes close to the summit of Kosciusko there are several lakelets, “weird beyond description,” the chief of which are *Cootapatamba Lake** (i.e., the lake where the eagles drink), *Blue Lake*† (also called *Lake Merewether*), *Lake Albina*, *Hedley Tarn*, and

*Also called *Lake May*, being so named by Townsend in 1846. It is a quarter of a mile long and about 17 feet deep.

† The *Blue Lake* covers 40 acres and is from 70 to 75 feet deep.



HOTEL KOSCIUSKO IN WINTER.

Club Lake. In their icy cold waters lives a species of trout met with nowhere else in Australia, but abounding in the mountain streams of Tasmania and parts of South America. No trees are met with on the slopes of Kosciusko after leaving the 6,500 feet level; many beautiful and hardy flowerets are found near the summit, and bird life is represented by a few wild ducks, larks, and eagles.

LATERAL SPURS FROM THE GREAT DIVIDING RANGE.

Many spurs branch off both to the east and to the west from the Great Dividing Range. Of those that belong to the Coast District the principal are the following:—

1. THE MACPHERSON RANGE commences at Bald Rock (15 miles from Tenterfield and 10 miles from Wallangarra) at the northern end of the New England Range. It first runs northerly to the vicinity of Maryland and afterwards north-easterly to Mount Wilson. Thence its course is easterly till it comes to an end near Point Danger. The range, from Bald Rock to Mount Wilson, forms a portion of the Great Dividing Range, and from Mount Wilson to Point Danger serves as a portion of the northern boundary of the State. It serves as a watershed between the basin of the Logan River in Queensland and those of the Tweed and Richmond in New South Wales. Its highest peak, *Mount Lindsay*, aptly described as “the grand warder of our northern frontier,” dominates the landscape for fully 70 miles around. It is a remarkable flat-topped remnant of a lofty plateau that in times past extended west to the Great Dividing Range and easterly to the coast. It rears its castellated summit 4,064 feet above sea-level, and the almost inaccessible cliffs forming its crown rise sheer to the height of a thousand feet. A coach road from Murwillumbah into Queensland crosses the eastern part of the range. The Macpherson Range intercepts and wrings dry the vapour-laden north-easterly winds that blow in this part of the State, and as a consequence, the Richmond River Valley enjoys a much larger rainfall than any other district in New South Wales. Within a short distance of Mount Lindsay

the Clarence, Richmond, and Logan Rivers have their origin. The range—rugged throughout—has an average height of 3,000 feet, and to the rich soil washed down from the tuffs and volcanic outflows of its southern flanks, is due the marvellous fertility of large areas in the Tweed and Richmond River basins.

2. THE RICHMOND RANGE, branching off from the Macpherson Range near *Mount Lindsay*, runs first southerly to *Mount Marsh*, and thence easterly to the ocean. It separates the Richmond and the Clarence River basins.

3. THE MACLEAY RANGE quits the New England Range a few miles north of Guyra and runs towards the coast for about 80 miles, forming a watershed between the basins of the Clarence on the north, and the Macleay on the south. It consists of a tangle of terrifying sunless gulches, winding through wild precipitous granite masses and basaltic ridges, whose sides are clad with dense forests and wreathing jungle. Its chief elevation is *Chandler's Peak*, which towers about 5,130 feet above sea-level. A spur from the Macleay Range, called the Snowy Mountain, runs south-east to Trial Bay, forming the western boundary of the Bellinger basin and the western and southern boundaries of the Nambucca basin.

4. THE HASTINGS RANGE leaves the New England Range near its southern end, and runs east to within a few miles of *Crescent Head*. It separates the basin of the Macleay and Hastings, the latter stream having its origin in the range. The most noticeable peaks in the Hastings Range are *Mount Kippara* and *Bunda Bunda*. About eight miles south of the range, but quite apart from it, stands *Mount Sea View*, a prominent peak, 3,100 feet in height, and lying inland 40 miles west from Port Macquarie.

5. THE MOUNT ROYAL RANGE stretches in a general south-easterly direction from the Liverpool Range, from which it branches off at *Ben Hall's Gap*. It is very rugged in character, and, as it stretches south, sends off numerous spurs, which penetrate the valleys of the Hunter and the Manning, both of which streams have their origin

in this range. Its highest peak is *Mount Royal* (or *Cobrabald*, 3,000 feet), situated near its south-western extremity.

6. THE HUNTER RANGE, a spur of the Main Range, commences at *Corricudgy* (3,000 feet), and stretching first N.E. and afterwards S.E. towards the coast, forms a portion of the southern boundary of the Hunter River Valley. Towards its eastern extremity it becomes greatly broken, and its numerous branch ridges penetrate far into the Hunter and Hawkesbury River basins. The great northern road between Sydney and the Hunter River winds through the eastern portion of this range. In addition to *Corricudgy*, which is common to the Great Dividing Range and the Hunter Range, the most prominent elevation is *Mount Warrawolong* (2,094 feet), about 20 miles inland from Lake Macquarie. The only other noteworthy peaks are *Mount Poppong*, *Mount Murwin*, and *Mount Pokolbin*, the last-named dominating the whole South Maitland landscape.

7. THE BLUE MOUNTAINS.—The region usually known by the name of the Blue Mountains consists of a rugged plateau in the County of Cook. It extends eastward from the Main Range, and is bounded on the north by the Colo River and on the south and south-west by Cox's River, while the Nepean-Hawkesbury flanks it on the east. Its backbone consists of a spur which leaves the Main Range about 10 miles south-east of Capertee, and running first southerly to Mount Victoria, and then easterly, terminates near Penrith. From this leading range there branches off to the east near Bell a spur which abuts on the Kurrajong Mountains close to Richmond. Between these two spurs is the Grose Valley, at the head of which is a neck of land called the *Darling Causeway* (the narrowest part of the main ridge already mentioned) three miles long, which serves as a line of separation between the Grose and Kanimbla Valleys. From the central axis of the Blue Mountains many lateral spurs branch off and give the whole region a broken and irregular appearance. The chief peaks are *Mount Clarence* (4,000 feet), *Mount Victoria* (3,525 feet), *Mount Hay* (3,270 feet), *Mount Tomah* (3,276 feet),

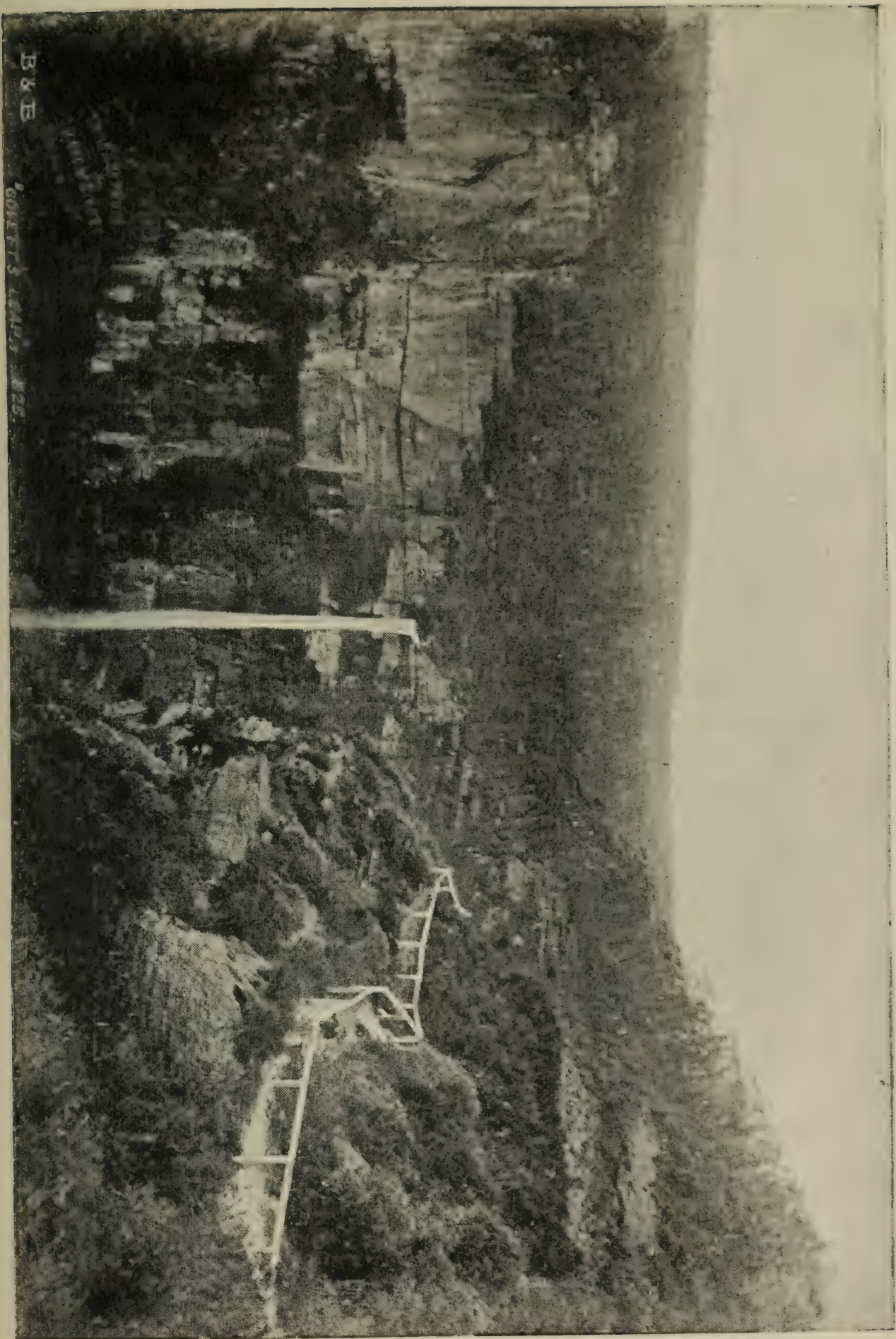


KATOOMBA FALLS—BLUE MOUNTAINS.

Mount Wilson, and *Mount King George* (3,470 feet), the last three of which lie in the ridge on the north side of the Grose Valley. When viewed from a distance a purple blue haze appears to hang over these mountains, and from this circumstance they received their name. Their soil is for the most part barren, except in a few isolated places such as *Mount Wilson*, *Mount Tomah*, *Mount King George*, and *Mount Hay*, on all of which the vegetation is luxuriant, owing to the presence of caps of decomposing basalt. The Blue Mountains area is noted for its coal seams, and, in a special degree for its beds of ironstone, kerosene shale, and limestone. The coal and iron deposits are chiefly worked at and around *Lithgow*. At *Newnes*, in the precipice-flanked *Wolgan Valley*, there is fully a mile of huge factory buildings equipped with up-to-date machinery for the production of kerosene oil and allied products for the Australian and foreign markets; while *Portland*, on the *Mudgee-Wallerawang* railway line, is the site of the largest and most flourishing cement works in Australia.

The Blue Mountains are furrowed by numerous deep gorges, such as the *Grose*, *Kanimbla*, *Jamieson*, and *Caper-tee Valleys*. These huge gorges have, in the course of ages, been carved out of the solid sandstone by the action of running water. The view afforded by these wildly picturesque and apparently inaccessible natural depressions are truly magnificent. The cliffs forming their sides are composed of horizontal strata of iron-stained sandstone, and "are so absolutely vertical that in many places a person standing on the edge and throwing down a stone can see it strike the trees in the abyss below. . . . If we imagine a winding harbour, with its deep water surrounded by bold cliff-like shores, to be laid dry," and a forest of graceful tree ferns, sassafras, and giant eucalypti "to spring up on its sandy bottom, we should then have the appearance and structure" they severally exhibit.* Into these vast chasms tumble several mountain torrents, many of which become lost in gauzy mist before reaching the bottom, while around

* See Darwin's *Journal of Researches*.



B & E

GOVETT'S LEAP—BLUE MOUNTAINS

Copyright Photo.

GOVETT'S LEAP—BLUE MOUNTAINS.

Kerry, Sydney.

nearly all of them the scenery is wild and romantic. The principal of these well-known cascades are those of *Govett's Leap*,† *Katoomba*, *Leura*, and *Wentworth Falls*, all close to the Great Western Railway, and within easy reach of the metropolis.

Writing on the origin of the Blue Mountain Valleys, a well-known Australian geologist remarked: "The vastness of the depth and the extent of the precipitous gorges and valleys of the Blue Mountains inspires one with feelings of silent awe and wonder, and impresses the minds of some persons with the notion we hear so often expressed, that such ravines in the mountains must have required violent convulsions in the earth's crust for their formation. But if we examine the rocks on all sides of the valley, we see no breaks or signs of violent disturbance as suggested. The various beds of rock in horizontal strata may be seen to continue uninterrupted around the sides of the valley, and the succeeding layers of rock, as we descend one side of the ravine, gradually approach the corresponding layers on the other side, until at the bottom, in the bed of the water-course, we find that they actually join which they would not do if the ravine had been violently torn asunder. We perceive, therefore, that the various outcropping strata must once have been continuous right across the valley or ravine, and that they have been removed by some agency without disturbance of the underlying beds. What then is this agency? *Not volcanic fire, but running water.*"

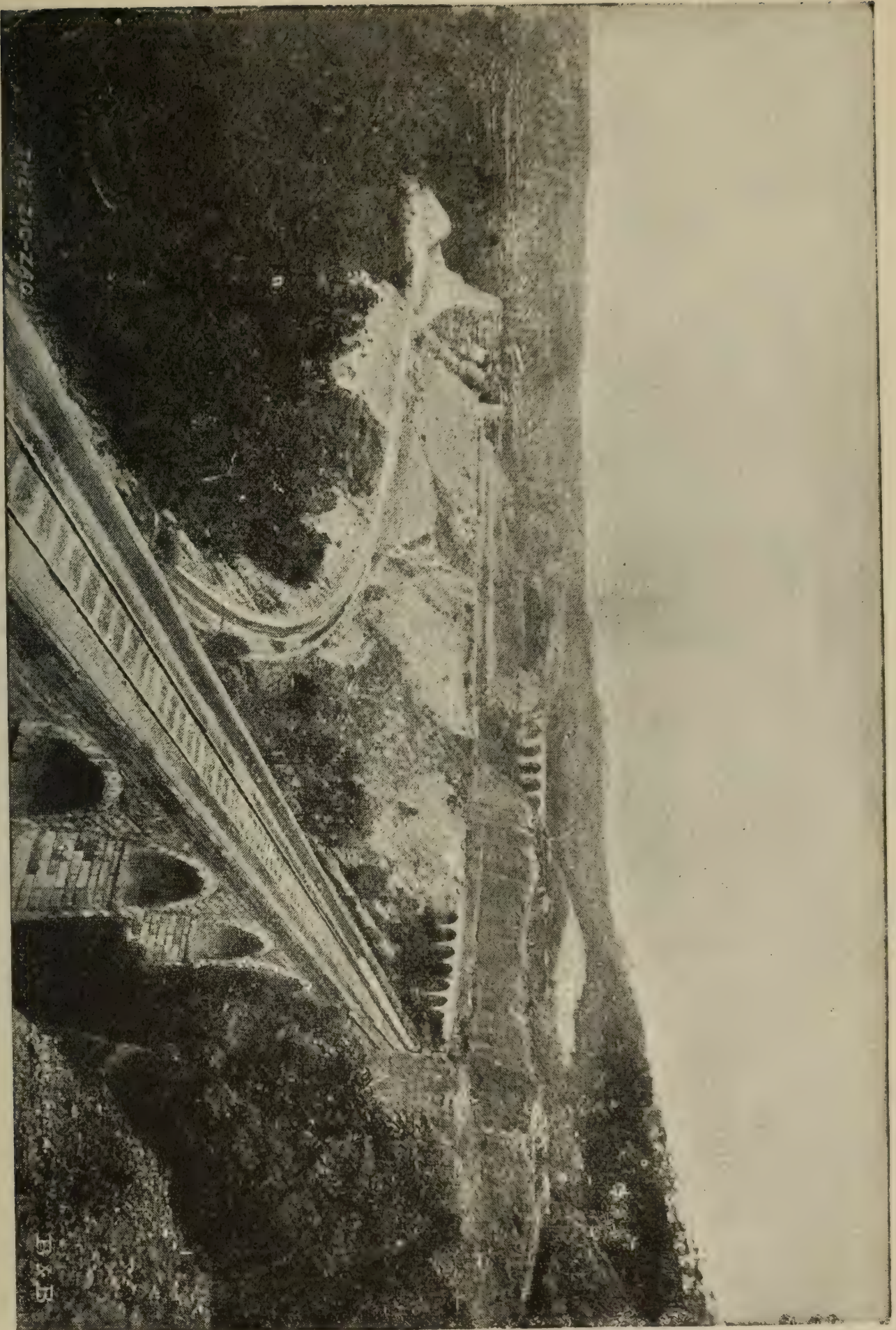
The Blue Mountains were first crossed by Messrs. Blaxland, Lawson, and Wentworth in 1813, and now one of the main railway lines of the State runs along their main ridge, from which, up to 1910, it descended again near Lithgow by means of a zigzag, said to be one of the greatest engineering curiosities in the world. This zigzag has now been replaced by tunnels whereby the strain on the hauling powers of the railway locomotives has been immensely lessened. Not only do the Blue Mountains possess the charm of beautiful scenery, but they are

† Called after a surveyor named *Govett*.

Copyright Photo.

THE LITHGOW ZIG-ZAG (NOW SUPERSEDED BY TUNNELS).

Kerry, Sydney.



swathed in a bright, bracing atmosphere. These factors, coupled with a cheap and rapid railway service, have combined to make these delightful uplands a huge summer playground for the people of Sydney.

8. THE MITTAGONG RANGE is a disconnected chain which runs transversely along a portion of the Southern Tableland. It commences on the eastern side of the Wollondilly, runs easterly past Mittagong, and connects at length with the Illawarra Range a short distance north of the township of Robertson. It is pierced near Mittagong by a tunnel belonging to the Great Southern Railway at "The Gib" (a contraction of Gibraltar), 2,830 feet above sea-level. The Gib is a denuded plug of an old volcano. It is composed of syenite, and from its summit is obtained a splendid view of the triangular Mittagong valley, which forms part of the Nattai River catchment area.

From the western side of the Wollondilly, and nearly opposite the western extremity of this range, a line of low, disconnected ridges runs north-westerly to *The Big Hill*, a peak in the Main Range near the source of the Abercrombie River. Another well-defined spur also branches off from the Main Range at *The Big Hill*, runs north-east to Cox's River, attaining its greatest height in *Mount Shivering* (3,678 feet), and forms part of the southern boundary of the Kanimbla Valley.

WESTERN SPURS OF THE GREAT DIVIDING RANGE.

Proceeding from north to south the chief of these are:—

1. THE NANDEWAR RANGE.—This spur branches off from the New England Range, near the village of Kentucky, about 12 miles south of Uralla. Its direction is first north-westerly, as far as Mount Drummond (24 miles N.E. of Narrabri, and close to Bundarra), thence north till it terminates about 10 miles from the banks of the Gwydir. It forms a portion of the watershed between the Gwydir and the Namoi River basins. The solidified outpourings of several long-extinct volcanoes are met with in this range. Its highest peak is *Mount Lindesay* (4,000 feet).

2. THE MOONBI RANGE.—This range, which is crossed by the Great Northern Railway between Moonbi and Walcha Road, branches off from the New England Range near the source of the Macdonald River, and throughout its whole course it is very rugged and broken. It runs in a northerly and north-westerly direction, separating the upper course of the Peel River from that of the Muluerindi, and terminates on the latter about 22 miles N.E. of Manilla. Its highest peak is *The Summit* (3,600 feet), and *Mount Gulligall* is a prominent elevation in the range.

3. THE PEEL RANGE.—This branch leaves the Liverpool Range at a point about 15 miles east of Quirindi and nearly opposite the Mount Royal Range. It runs north-west to the township of Carrol on the Peel River between Tamworth and Gunhedah. It separates the basin of the Peel from that of the Mooki (or Conadilly), a smaller stream. Its highest peak is *Mount Turi* (locally called *Duri*), nearly 3,000 feet. This range is crossed by the Great Northern Railway close to Currabubula.

4. THE WARRUMBUNGLE RANGE.—This rugged line of heights may be considered as a north-westerly prolongation of the Liverpool Range. It terminates close to Coonabarabran, whence a low offshoot runs north and west through the western portion of the Pilliga Scrub. Close to its western end an offshoot, called the Talbragar Range, runs west past Coolah, Dunedoo, and Cobborah, and then north-west past Gilgandra and Gulargambone, till it terminates near the township of Quambone west of Coonamble. Lava flows are met with throughout the Warrumbungle Mountains, and indeed, the denuded necks of these old volcanoes of a bygone age form a most remarkable feature of the scenery of this interesting and picturesque region. The sandstone beds of portion of the Warrumbungles belong to the same geological age as the Hawkesbury sandstone, so much in evidence about Sydney and the Blue Mountains, and form besides, a portion of the intake beds of the artesian water-bearing basin of the north-west. The Castlereagh and all of its feeders on the right bank rise in

this range. Its highest peak is *Mount Exmouth* (3,000 feet), and within a few miles of its eastern extremity (where the spur itself is often known locally as the Liverpool Range), is *Pandora Pass*, through which the explorer Allan Cunningham had to force his way.

5. THE MACQUARIE RANGE.—This offshoot leaves the main range near Shooter's Hill. It stretches first north-westerly, and afterwards northerly, separating the upper tributaries of the Macquarie from those of the Lachlan, and terminates not far from the junction of the Cudgegong and Macquarie Rivers. Its highest peak is *Mount Canoblas*, a group of volcanic crags (4,610 feet in elevation), plainly visible from the towns of Orange, Blayney and Carcoar. *Mount Lachlan* (or *Mount Macquarie*), another prominent peak, is close to Carcoar, and reaches a height of 3,943 feet. In the Macquarie Range rise the Lewis Ponds and Summer Hill Creeks, where the first payable goldfield discovered in Australia was worked in 1851. Its slopes are mainly devoted to sheep-grazing and wheat-growing. The Macquarie Range is crossed by the Great Western Railway near Newbridge and Millthorpe. From the neighbourhood of Mount Canoblas an offshoot of the Macquarie Range runs north-west past Molong, and afterwards west under the name of the *Curumbenya Range*, out on to the plains north of Parkes, and onward past Fifield and Nymagee until it breaks up into numerous low ridges in the copper-bearing belt in which Cobar, Mount Drysdale, Mount Boppy, and Hermidale are situated. About midway between Molong and Peak Hill another range branches off from the Macquarie Range, running north towards Dubbo, under the name of *Harvey's Range*, from which a low range of hills runs north-west past Narromine and Warren, and forms part of the watershed between the Macquarie and the Bogan basins.

6. THE MUNDOONAN RANGE.—This spur branches off from the Cullarin Range a little to the north of Lake George, and runs westerly to the vicinity of Cootamundra. Around this town a spur curves southward towards

Gundagai, while a lower series of ridges runs west and north-west towards the Lachlan, passing on the way westward of Temora, Barmedman and Wyalong. It is crossed near Young by the Blayney-Harden railway line, which forms a connecting link between the Great Southern and Great Western trunk lines. It separates the upper basins of the Lachlan and Murrumbidgee, and reaches its highest elevation in *Mundoonan* (2,674 feet).

7. THE MURRUMBIDGEE RANGE.—This is a northerly offshoot from the Muniong Range. It is extremely rugged, and several of its peaks approach 7,000 feet in elevation. It separates the upper basin of the Murrumbidgee from that of its tributary, the Goodradigbee, and, as far as is known, attains its highest elevation in *Murragural*, 6,987 feet in altitude.

8. THE TUMUT RANGE.—This also is a spur from the Muniong Range. It runs north, separating the upper courses of the Goodradigbee and Tumut Rivers, and terminates near the Murrumbidgee, above Gundagai. The range is wild and rugged, and its slopes and foothills are in many places gold-bearing.

9. THE MURRAY RANGE.—This is the most southern of the lateral branches of the Muniong Range. It leaves the main range near Mount Kosciusko, and runs north and west, separating the upper portions of the Tumut and Murray basins. Its highest peak is *Mount Dargal* (5,490 feet). From this range a line of heights runs west and north past Henty and Lockhart, till it terminates near the Murrumbidgee, about ten miles from Narrandera.

THE COAST RANGES.

Four well-marked ranges lie in the Coast District at varying distances from the sea. As a rule, they run parallel to the tablelands, of which in places some of them form the eastern edge. Proceeding from north to south these ranges are:—

1. THE NORTH COAST RANGE.—This range runs from north to south, from Mount Marsh, in the Richmond

Range, to the Hastings River District. In the first part of its course, between Mount Marsh and the Clarence River, it is called *Coal Ridge*. South of the Clarence it is by no means a continuous chain, and it is pierced further south by the Macleay River. The average height of the range is about 2,000 feet. South of the Clarence a branch spur runs east to Coff's Harbour, and forms the northern boundary of the County of Raleigh.

2. THE ILLAWARRA RANGE.—This range is so named because it forms the most conspicuous feature of the Illawarra District, of which it is the western boundary. It rises abruptly from the sea to the height of 1,000 feet at Clifton (or Coal Cliff), a little to the north of Bulli. It recedes inland as it stretches southward, but on the whole its average distance from the sea is little more than five miles. As it approaches the northern bank of the Shoalhaven River it becomes known locally as the Cambewarra Range. The Illawarra Range is capped by rugged sandstone masses, and is traversed throughout by valuable coal seams, which crop out upon its seaward face. These seams are worked at Clifton, Bulli, Corrimal, Mount Keira and Mount Kembla, inclines and short railways connecting the collieries with the ports and jetties at Bulli, Bellambi, Wollongong and Port Kembla. At Clifton the tunnel opens out on the sea cliff. The Illawarra Range forms a portion of the eastern fringe of the Southern Tableland, and, although it is somewhat higher than that portion of the plateau immediately to the west, its altitude throughout is much below that of the whole tableland. Its most conspicuous elevations are *Broker's Nose* (1,437 feet), *Mount Keira* (1,533 feet), and *Mount Kembla* (1,752 feet), the last two of which stand out in front of the range, with which they are joined by necks of sandstone. This range throughout its whole course presents an almost perpendicular face to the Pacific, but notwithstanding the steepness of its eastern descent, it is crossed by three good roads—one over Bulli Pass, near its northern extremity, another from Mittagong over the Macquarie Pass, while the third

leads from Moss Vale into the Illawarra District near Jamberoo. The outlook from the top of the Bulli Pass is one of the finest in the State. Busy townships lie at the foot of the range, Lake Illawarra looms in the distance, the graceful group of the Five Islands is seen nestling close to the seashore south of Wollongong, while on clear days the Pacific Ocean in all its expansive grandeur is spread out before the wondering eyes of the spectator.

3. THE CURROCKBILLY (or BUDAWANG) RANGE.—This extremely rugged range commences on the south bank of the Shoalhaven River, about six miles south-east of Marulan. It runs first south-east for about 25 miles, till it unites with a spur called the *Turpentine Range*, stretching south-west from Nowra. From its junction with this ridge the Currockbilly Range stretches to the south and terminates on the north bank of the Moruya, about eight miles from the ocean. For a considerable distance it runs parallel to the Gourock Range, and forms the eastern boundary of the Upper Shoalhaven Valley. During almost its whole course it forms the eastern edge of a portion of the Southern Tableland, above the general level of which, however—unlike the Illawarra Range—it rises to a considerable height. Its chief elevations are *Budawang* (3,630 feet), *Currockbilly* (3,619 feet), and *Pigeon House* (2,389 feet). The last-named forms from the sea a conspicuous landmark, and was named by Captain Cook on account of its resemblance to a dove-cot.

4. THE SOUTH COAST RANGE.—This is a spur from the Monaro Range, and forms the eastern and southern boundaries of the Upper Snowy River basin. It leaves the Monaro Range east of Nimitybelle, and runs in a southerly direction towards the Victorian border, on approaching which it bends to the westward, and terminates on the left bank of the Snowy River. Its highest peak is *Delegate Hill*, in Victoria (4,000 feet), while the loftiest in the New South Wales portion is *Coolangubra* (3,712 feet).

In addition to the above, a low range sweeps in the

form of a semi-circle from near Mount Dromedary to Bega, and attains its greatest elevation in *Mumbulla*, 2,630 feet high.

RANGES OF THE INTERIOR.

Near the extreme west and north-west of the State, verging on South Australia and Queensland respectively, stand out two fairly well-defined ranges of no great extent or elevation, the *Barrier Range* and the *Grey Range*. They form the western edge of an extensive depression, through which the largest rivers of the continent hold their devious course. Rich and extensive lodes of silver and lead ores exist, and are worked in the Barrier Range, at Broken Hill, Silverton and Thackaringa, and the Mount Browne goldfields are situated along the slopes of the Grey Range. The highest elevations in the Barrier Range are *Mount Lyell* (2,000 feet), and *Mount Arrowsmith* (2,000 feet). *Mount Browne*, *Mount Sturt*, and *Mount Poole* are the most prominent peaks in the Grey Range.

Running in a north-westerly direction between Parkes and Cobar, and forming a watershed between the Lachlan and Upper Darling basins, a number of disconnected ridges are met with, but they only rise a few hundred feet above the level of the surrounding plains. They consist in the main of a line of primary rocks, and form the basis of a much higher range that probably existed many ages ago in this part of the State.

ISOLATED MOUNTAINS.

At intervals in the district east of the Great Dividing Range several mountain peaks, altogether apart from any continuous chain, stand out as prominent landmarks. Working from north to south the chief of these are:—*Mount Warning* (3,840 feet), about eight miles away from the Macpherson Range, and not far from the head of the Tweed River. This basalt-capped peak is a well-known landmark for coasting vessels, and is visible in fine weather 60 miles away. It was named by Captain Cook, because after passing it he was carried by a current into dangerous

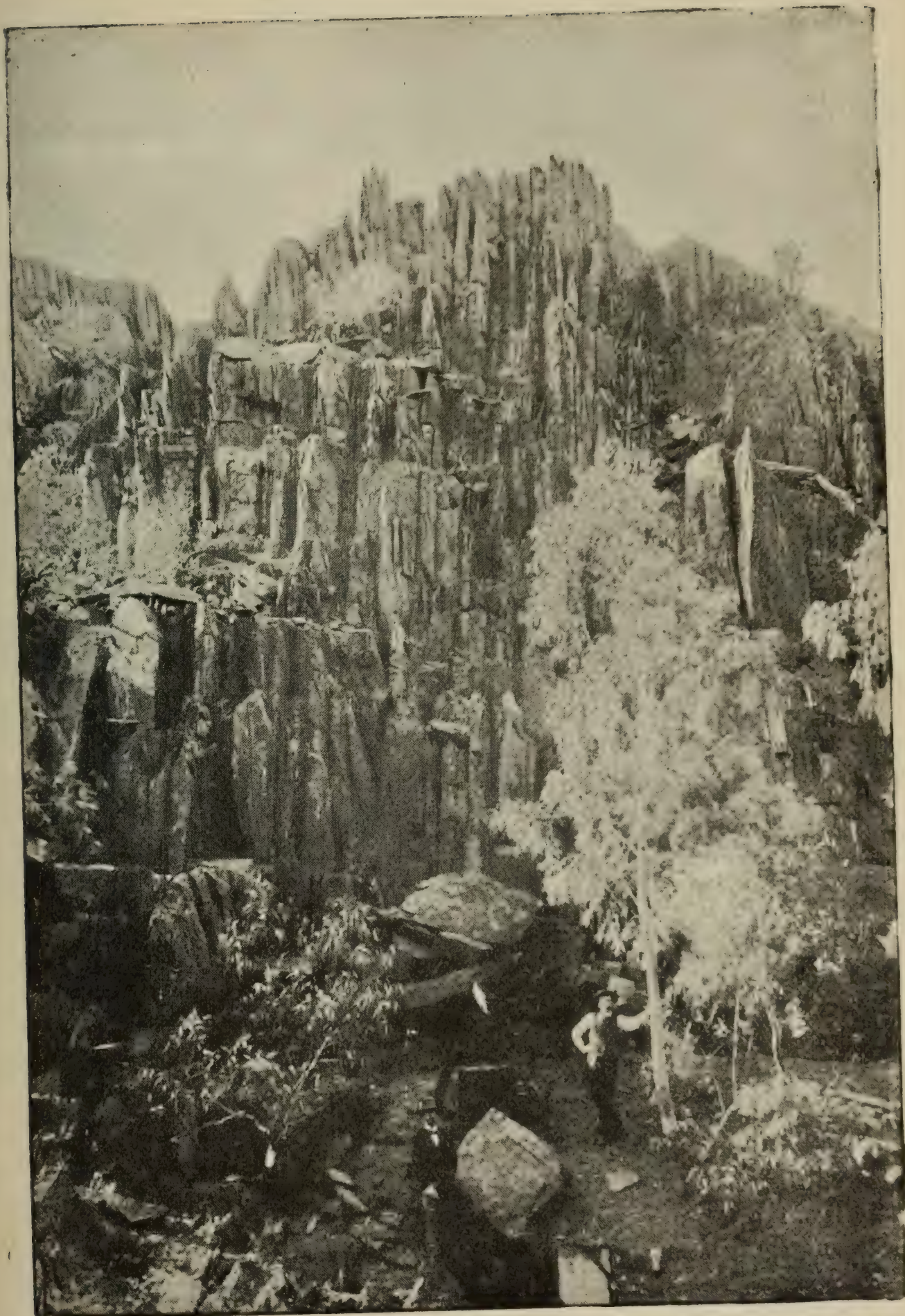


Photo. by Rev. J. Milne Curran.

STURT'S DEPOT GLEN.

proximity to the treacherous rocky shoals off Point Danger. Mount Warning is perhaps the most picturesque mountain along the coast, and is surrounded by foothills which rise 2,000 feet above sea-level.

Mount Doubleduke (836 feet), a little to the north of Shoal Bay. It is remarkable at a considerable distance out at sea.

Mount Wohiman (also called *Clarence Peak*), to the south of Shoal Bay, on the road from Yamba to Grafton. This is the peaked hill observed by Captain Cook. Height, 1,200 feet.

Elaine, lying at the head of the Glen Ugie Creek, about 12 miles south-east from Grafton. It is one of the most picturesque landmarks in the Clarence District, and from its flat top an extensive view is obtained.

Yarrahappini, near the coast, about four miles north of Trial Bay.

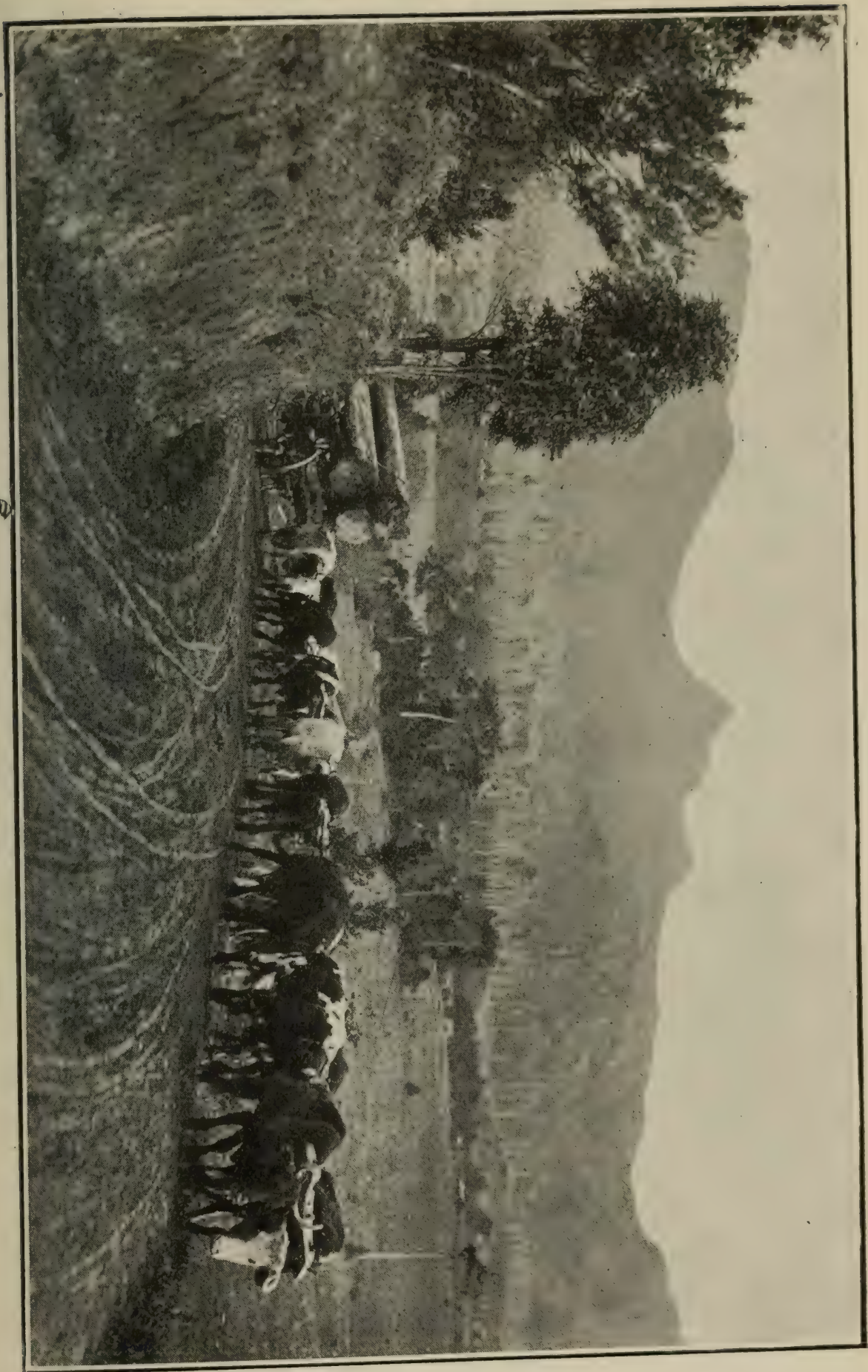
Mount Sea View (or *Kokomerican*), about eight miles due south from the Hastings Range. It stands about 40 miles inland from the sea, and was so named by Oxley in 1819, because from its summit he obtained a magnificent view of the ocean. It rises to a height of 3,100 feet above sea-level.

The Brothers (viz., the *North*, the *South*, and the *Middle Brother*), three lofty and conspicuous peaks near Camden Haven in a north-easterly direction from Taree. These mountains were seen and named by Captain Cook. Height, 1,700, 1,650, and 1,910 feet respectively.

Talawah, south-west of Taree and north of Cape Hawke.

Jellore, about seven miles north-east of Mittagong, and close to the source of the Nattai River. It is conical in shape, and on fine clear days is plainly visible from Sydney, 70 miles distant. Jellore is an extinct volcanic cone, consisting of trachyte, which rises abruptly from the surrounding sandstone country. From the trigonometrical station on its summit (2,374 feet above sea-level), there is obtained a magnificent view northward over the Wollondilly River.

TIMBER FROM THE SLOPES OF MOUNT WARNING—TWEED RIVER.



Coolangatta (1,000 feet), near the mouth of the Shoalhaven River.

Dromedary (2,706 feet), a prominent landmark south of the Tuross River, about four miles inland. It was so named by Captain Cook from its resemblance to a dromedary's back.

Imlay (2,910 feet), about nine miles south-west of Two-fold Bay.

EXTINCT VOLCANOES.*

At the present time there are no active volcanoes in New South Wales, nor indeed on the Australian continent. In past ages, however, Australia was the scene of violent volcanic activity. Eruptions occurred at intervals in all geological periods from Silurian to Tertiary and Post-Tertiary, the lava flows of Tertiary age, however, being apparently the most extensive. The well-known Kiama basalt, or blue metal, so largely used for macadamising streets and for ballasting railway lines, is in truth only a solidified lava, and was ejected during the Permo-Carboniferous period—that to which the coal seams of Newcastle, Lithgow, and Illawarra belong. At Kiama the basalt may be seen overlain in places by rocks belonging to that age. In the seaward face of *Nobbys*, at Newcastle, a basaltic dyke may be seen intruding upwards through the Coal Measures which form the headland. As a result of this intrusion the coal seams in the cliff have been baked into coke for about 10 feet on each side of the dyke. At several places not far from Sydney (*e.g.*, at Bondi, Pyrmont, Belmore, Burwood, Homebush, Pennant Hills) occur extensive volcanic dykes that have been thrust up through the shales and sandstone. Similar intrusions may be observed in some of the railway cuttings near Tenterfield, where the basalt has been forced up through granite. At *The Valley*, at a place called *Siberia* (not far from the Glenbrook Railway Station), and at *Euroka Farm* (on the Nepean, 10 miles south of Penrith)—all near the eastern edge of the Blue Mountains—are three vents representing

*Vide *Geology* (pp. 130-147).

a line of weakness along which volcanic activity exerted itself probably in Tertiary times. Near the great reservoir at Prospect an intrusion of dolerite and basalt half a mile wide forms a conspicuous hill over 400 feet high, which is supposed to be the site of an old volcanic pipe. Flat-topped basaltic hills (as a rule of Tertiary and Post-Tertiary age) occur in many places in the State, and great sheets of basalt, every one of which poured as a river of molten rock from the fiery crater of some long-extinct volcano, are found at intervals on the tablelands and along the flanks of the Great Dividing Range and several of its spurs. In times long since past, when Australia was divided into two great islands by a sea extending through the centre of the continent, from the Gulf of Carpentaria to probably the Great Australian Bight, a long line of volcanoes extended from Mount Canoblas, near Orange, northwards through the Warrumbungle and Nandewar Ranges and onward as far as the Glass House Mountain beyond Brisbane. Behind the town of Bathurst a basalt ridge, known as the Bald Hills, marks the former bed of the Macquarie River, covered by an outflow of lava for many miles and thus preserved at its original height, while the surrounding country has been worn down many hundreds of feet.

The existence of basalt on the slopes of Mount Kosciusko, and at several places on the Blue Mountains shows that the "Roof of Australia" and the highlands west of Sydney were in times past lit up by volcanic fires.

In New South Wales, now-a-days, very few earthquake disturbances are felt, and those experienced are very mild. Evidences of past earth movements are met with all along the mountain area. On the flanks of the Blue Mountains, west of Sydney, for example, the sudden drop from Glenbrook to Emu Plains is due to an earth folding, which reduced Sydney Harbour, Broken Bay, and Botany Bay from the dignity of elevated mountain valleys to their present-day condition of extensive fiords, with boundary rock masses of no great height above sea-level. On the plateau tract north of the Grose Valley also, a drop of

400 feet may be seen between Mount Tomah and Kurrajong, and this was due to earthquake disturbances of a bygone age. Now-a-days, the few earthquake shocks we experience only result, at the most, in the breaking of a few cups and saucers, or in disturbing the slumbers of a few uneasy sleepers.

RIVERS.

The main watershed for the rainfall of New South Wales is the Great Dividing Range, which marks off the country into an eastern and western slope.* As the mountains in no instance rise to the snow-line (here roughly about 8,000 feet), the rivers have to depend for their water supply upon the rainfall, with the exception that in the spring and early summer the melting of the snows on the higher slopes of the Kosciusko Plateau, helps during these months to swell the volume of the Murray, the Murrumbidgee and some of their tributaries. The volume of the rivers thus varies with the season, and while in summer they are, as a rule, considerably contracted, they are usually swollen in winter. These conditions are the reverse of those prevailing in the other continents, where the melting of the snow in summer causes the rivers in that season to have a much greater volume than at other times of the year.

The rivers of the Eastern Slope are short because the Dividing Range is not far from the ocean. The Hawkesbury and the Hunter are prominent exceptions, their greater length being due to their exceedingly winding courses. The fall of the eastern rivers is also great, hence in periods of exceptionally heavy and sudden rainfall they frequently boil over their banks, and flood the low-lying portions of their basins, causing great destruction to property and even to life. Although these

*In addition to these two main slopes there are two others, viz., a SOUTHERN SLOPE, drained by the Snowy River and its tributaries and an INLAND SLOPE, comprising the Lake George Basin in the Cullarin Range.

floods cause sad havoc during their continuance, yet they render a double service to the farmer—first, by supplying his lands with a rich top-dressing of silt which they deposit over the low-lying surrounding districts, and secondly, by washing out to sea the sand accumulations which so much hamper navigation, and prevent the farm produce reaching the city markets. As examples of tracts built up by river-borne soil, we may instance the alluvial lands skirting the Clarence, Hunter, and Shoalhaven, which are noted for their depth and fertility. Among the disastrous floods that have occurred in the Coastal District perhaps the best remembered is that of the Hunter River in 1893, when the whole of the low-lying district from Newcastle to far beyond West Maitland was deluged, and hundreds of settlers were rendered homeless.

Nearly all the coastal rivers have bars at their mouths. These sand accumulations greatly hamper river navigation, and are caused by the combined actions of waves, tides, and the outflowing currents. The waves stir up and lift the sand which is then carried by the rising tide into the shallow water where it is deposited. The ebb tide, being unassisted by the waves, is unable to cope with the incoming sand, and thus when the tides and waves are left to themselves the tendency is to silt up the entrances altogether. Hence the bad condition of several of the coastal river entrances in times of prolonged drought or after the prevalence of on-shore winds and heavy seas. The usual river outflow is responsible too for some of the bar accumulations, for the river water on reaching the sea has its power of transporting suspended matter greatly reduced. The condition of the river mouths is best after floods, for then the rivers act as powerful excavators, sweeping the sand accumulations out to sea, and so open the channels for shipping. The presence of these sand-bars has necessitated the carrying-on of much dredging work, and the construction of several expensive training walls and breakwaters to minimise the evil.

The rivers of the WESTERN SLOPE belong to one great

system—that of the MURRAY-DARLING—while those of the Eastern Slope are all disconnected streams, and have a more uniform volume than those of the West. The Dividing Range and its eastern spurs are, as a rule, high enough to act as a barrier to the winds blowing from the ocean, the result being that the moisture these winds bring is precipitated on the seaward flanks, very little passing over to feed the streams of the interior. When, as is sometimes the case in summer, a series of water-laden monsoons blow in from the tropics, the western plains experience abundant rains, and then the rivers of this region become greatly swollen—at times rising over their banks and flooding the surrounding country for miles. As examples of such inundations may be mentioned the disastrous Bourke flood of 1890, which caused immense damage to stock and buildings, and the Gwydir-Namoi floods of 1910, when the greater part of the country around Gunnedah, Narrabri, Walgett, and Moree was converted into a huge inland sea. As a rule, however, during dry seasons the majority of the rivers of the Western Slope are almost dry for many months of the year. In many cases in summer they flow for considerable distances rather through than above their extensive beds of sand, shingle, and drift. In consequence of the gradual slope of the plain country westward from the tablelands, the fall of these rivers is but slight, the general fall of the Darling being but three inches per mile. The rule that holds good in almost all other parts of the world with regard to rivers—viz., that their volume increases with the distance from their source—is violated in the case of these streams, partly on account of excessive evaporation resulting from the great heat of the plains, and partly on account of the thirsty nature of the soil.

What potent factors these are in reducing the volume of our western rivers is shewn by the fact that only 2 per cent. of the rainfall of the Upper Darling basin passes the town of Bourke. In comparison, therefore, with their length, the volume of most of the rivers of the Western Slope is but trifling. They are rarely in flood; many of them, in

fact, consist of a string of waterholes for many months of the year, and hardly one of the longer tributaries of the Darling reaches the main stream except during floods.

That a western river flood is a visitation truly to be dreaded, may be gathered from the following account of the greatest known inundation of the north-west—that of January, 1910, referred to above—from the pen of the *Sydney Morning Herald's* special representative.

“As it was imperative to get boats through to Wee Waa and other parts of the flat country, a suggestion was made that boats should be taken down to the swollen rivers from Gunnedah to Boggabri, a distance of 40 miles. Permission having been secured from headquarters, two rowing boats, which had been brought up from Newcastle by train, were transferred to lorries and taken to a point four miles from Gunnedah. Here they were floated, and a party of eight, including a pressman, started for Boggabri, where a special train was waiting to receive the boats and take them on. The trip was exciting enough for the most adventurous spirit. Every minute the boats were threatened with disaster, but wonderful to relate they kept afloat, and ran down stream at a great speed.

“The course of the river was followed as much as possible in order to avoid the boats being pierced by snags, but times out of number the river was left, and the boats flew overland for miles, dodging trees, snags, driftwood, and household debris of all descriptions. Several times the boats became stranded, and the occupants had to get out and push them into the main channels again. In some places the flood was miles wide, and the rushing current was the only indication of the course of the river. Then again, as the surrounding country became higher, the river narrowed, and swept along at furious speed, and the occupants held their breath as they swept over the rapids. All the men were splendid rowers. Had it been otherwise, the boats would never had got to their destination. For miles it was impossible to row a stroke. All that could be done was to look well and shoot the boat into mid-stream,

when a collision with trees was threatened. Numberless times a capsize appeared certain, but in the nick of time it was averted. Every occupant was a worker, and long before Boggabri was reached they were utterly exhausted with their strenuous exertions. The low-lying country was found flooded for a width of 10 to 20 miles. Farmers' homes came into view standing in four feet to eight feet of water. Others again were seen as the flood had left them with a wall of debris piled up against them. On the higher land, settlers were just returning to their homes, and the question invariably elicited the reply that everything inside and outside the house was either gone or completely ruined.

"Thousands of drowned sheep were passed. The bodies were piled against trees in dozens. In one pile 50 sheep were counted, besides carcasses of cattle and horses that had perished. One was hanging by the neck to a tree. Several beasts were seen high up in the trees, where they had got jammed and the waters had left them. Thousands upon thousands of rabbits have perished. The water is absolutely littered with them in places. They are so thick that there is not a foot distance between the bodies. Scores of live rabbits were also seen. They swarmed over driftwood, and were floated down stream on logs and boxes.

"On one piece of high ground in the midst of raging waters, a dozen bullocks were found alive. Sheep were also found crowded into a little island of driftwood. Half way to Boggabri the surrounding country was found much higher, and the homesteads free from water; but nearer Boggabri the flooded conditions again prevailed; and dozens of homes, half-submerged, were seen on both sides of the river. Settlers here spoken to, also reported that they had lost everything."

During this flood the people of Wee Waa had their homes inundated to a depth of four or five feet; at Moree, the Gwydir rose 16 feet in the course of a night, flooding the greater part of the town, and causing the inhabitants to flee for their lives to the few isolated spots more elevated

than the rest. Tamworth was in an almost similar plight; while the narrow escape of the people of Walgett—the town being converted into an island—may be gathered from the following:—

“Notwithstanding the fact that both the Barwon and the Namoi Rivers continue to rise and spread, Walgett is still just beyond the reach of the flood. The town is now a tiny island in an immense sea of water. Profiting by the disastrous flood of 20 years ago, the principal streets have been raised two or three feet higher. Up this grade the water is creeping inch by inch, and there is a procession of townspeople to the water’s edge to watch its progress. Standing at the post office in the centre of the town, one can throw a stone into the approaching water. The cordon is being drawn tighter and tighter, and in one spot another eighteen inches will see the water flowing through the streets unprotected.

“An inconceivable volume of water, 10 miles wide, is racing down the Namoi. Another, equally wide, is sweeping down the Barwon. The Cumberdoon Creek is quite eight miles wide, and there are half a dozen subsidiary creeks and wambools which have been converted into raging Niagaras. All these immense volumes of rushing, surging water, coming along at a terrific pace, suddenly reach the flat country which stretches away from Walgett for miles, and spread over the surface with astonishing rapidity. The result is that the whole of the low-lying land for hundreds of miles is one vast expanse of water. Reports are coming in from stations commanding an expansive outlook, that it is impossible to see any land in the vicinity—nothing but one unbroken sheet of muddy water moving in one direction.”

The Murray-Darling basin is of immense extent, covering as it does, an area of about 414,253 square miles,* double that of the whole of France. Of this, only about

*105,000 square miles in Queensland; 230,000 square miles in New South Wales; and the remainder in Victoria.

160,000 square miles make any effective contribution to the volume of the river. The remainder consists largely of delta lands, or other flat alluvial areas that quickly absorb the rainfall, or that afford a scanty run-off only during exceptional floods, when their contribution serves and will continue to serve no really useful purpose until Australia adopts some thorough-going scheme of conserving its flood waters for use in dry seasons.

Below Wentworth, the waters of all the streams comprising the Murray-Darling system flow as one wide navigable waterway (the Murray), till they discharge at length into the ocean. The story of its varied constituent waters is a wonderful one:—

“Born in baby streams by far-off Warwick, in the rolling downs of Queensland, rolling on by leagues and leagues of arid plains, the waters of the Darling joined by all the wonderful rivers of the north-west, bear their tale of great spaces to the sea.

“Born in snowfed rivulets under the heel of Mount Kosciusko, joined by all the streams that drain the northern districts of Victoria—the dark Goulburn and the dreamy Loddon—freshened on the other side by the roving Lachlan and the historic Murrumbidgee, the waters of the Murray, mingling with the waters of those distant Queensland Downs, bear down also their tale of great distances to the sea.

“Looking out with an eye of imagination, one saw the vast territory which is served by this, one of the largest river systems in the world, and forecasted a future when these precious waters would no longer be allowed to waste, but would fill their destined function in fertilising the eleven millions of irrigable acres contained within the Murray basin. As regards this matter there is no longer a problem for discussion—the problem has been solved—irrigation, wherever it has been scientifically attempted in Riverina, has proved an unqualified success. The whole subject therefore becomes a simple equation. On the other hand, we have ten million acres of the most fertile, if yet arid, soils

on earth. Traversing these lands is a network of long sluggish rivers, natural canals. The calculations of competent engineers show that with existing rainfalls sufficient water can be conserved, and conveyed via these natural canals to the awaiting acres. Experiments such as Mildura have demonstrated the results; they have proved that on ten irrigable acres of these arid soils a family can live up to the highest standards of Australian comfort. Therefore, there is room in Riverina for a million families engaged in agricultural production, which would mean more than ten millions of population. Of course, production will have to be varied, but it must be remembered that these soils are not suitable for the cultivation of fruit alone. They will yield with correct treatment eight and nine crops of lucerne per annum, and lucerne, among other things, means dairy farming and the fattening of lambs for market. There is no end to the variety of agricultural production on irrigable acres, and there is no predicting the possibilities of the future. Australians will yet realise that in territory which they were once prone to condemn as well-nigh worthless lie potentialities that are not within the grasp of any other country when the Western River system will play a star part in the great drama of Australian nationality."

IRRIGATION SETTLEMENT IN THE MURRAY-DARLING AREA.

It is only within comparatively recent times that those Australian States most interested in the Murray-Darling River System have seriously taken steps to utilise its surplus waters on a large scale. Victoria made a commencement in 1884 by the establishment of the first irrigation settlement at Mildura, in the heart of the despised red soil—mallee country. Mildura is on the left bank of the Murray, about 16 miles above its junction with the Darling. The settlement was founded by the enterprising and foreseeing Messrs. Chaffey Brothers, to whom Australia will some day erect a monument. It was carried on under their guidance till 1895, when the whole management was placed

by the Government in the hands of the Mildura Irrigation Trust. Since then the settlement has made rapid progress, the settlers utilising the soil to advantage, and obtaining excellent results. Water is pumped from the Murray into channels at various levels, commanding an irrigable area of about 35,000 acres whereof about 10,000 are under intense cultivation. The crops raised include raisins, sultanas, currants, apricots, peaches, and citron fruits, representing an annual value of £170,000. Mildura exports its dried and canned fruits to the other Australian States, chiefly New South Wales and Queensland, while nearly £10,000 worth is shipped overseas. The population of Mildura, which at the Census of 1891 was 234, has now increased to well over 5,000.

South Australia entered upon irrigation development by establishing a settlement at Renmark in 1887. Renmark is on the north bank of the Murray, 43 miles below the Victorian border, and 350 miles from Lake Alexandrina. The fathers of Renmark, as of Mildura, were the Chaffey Brothers, who discovered that the red soil of the mallee country would produce raisins and other fruits as good as were ever dried under Californian suns, or on the historic hillslopes of the Levant. Renmark is now controlled by a trust appointed by the South Australian Government. A recent visitor to this settlement thus writes:—

“In 1896, the value of their produce was £6,878. In 1906 it had risen to £52,000. In 1896, Renmark held 2,700 acres under irrigation. In 1909, this area had increased to 4,900 acres, and the yearly output was £85,000. The total output of dried fruits in 1910 was nearly 2,000 tons. On these 4,900 acres of mallee, which originally supported one family with difficulty, 2,000 Australians now enjoy a life of prosperity and contentment.

“It is a wonderful chapter, but other chapters equally bright will yet be written in the volume of irrigation. There remains a virgin page of eleven million acres in Riverina whereon to inscribe the illuminated text of successful settlement.

“ It was a pleasant drive around the orchards and vineyards. The bright green leaves of the raisins, and the dark shade of the currants, the tamarisk hedges and willows and walnuts; the breakwinds of stately sugar gums, the pine and date-palm avenues, leading to settlers’ houses, embowered in shrubs and fruits and flowers; the irrigation channels with lush green growths around them—all this made up a charming oasis in the drab landscape of sand and mallee. The contrast between bare red sand and stunted scrub and this area of wealth and tillage was striking. On one side of an olive hedge gleamed a fertile area yielding a ton of dried apricots to the acre, having a market value of £61 a ton. On the other side of the hedge spread only a sun-scorched, saltbush plain, swept by hot winds, and desolate and bare. Yet the pale potent water that filled the channels and runnels beside the dusty roads we drove over was capable of converting that plain also into a smiling garden.”

Irrigation on a fairly large scale commenced in New South Wales in 1890. This was the Wentworth Settlement, near the junction of the Darling and Murray, in a notably arid tract of country with a continuously inadequate rainfall. Here the Government has erected a pumping plant, while irrigation channels carry the water raised from the Murray through more than a thousand acres of land. By this means the settlement enjoys an equivalent to the rainfall of the North Coast, and this water under human direction and control is applied to the land just when the young crops require it. Vegetables, fruits, and lucerne are the chief products of these Wentworth irrigation areas.

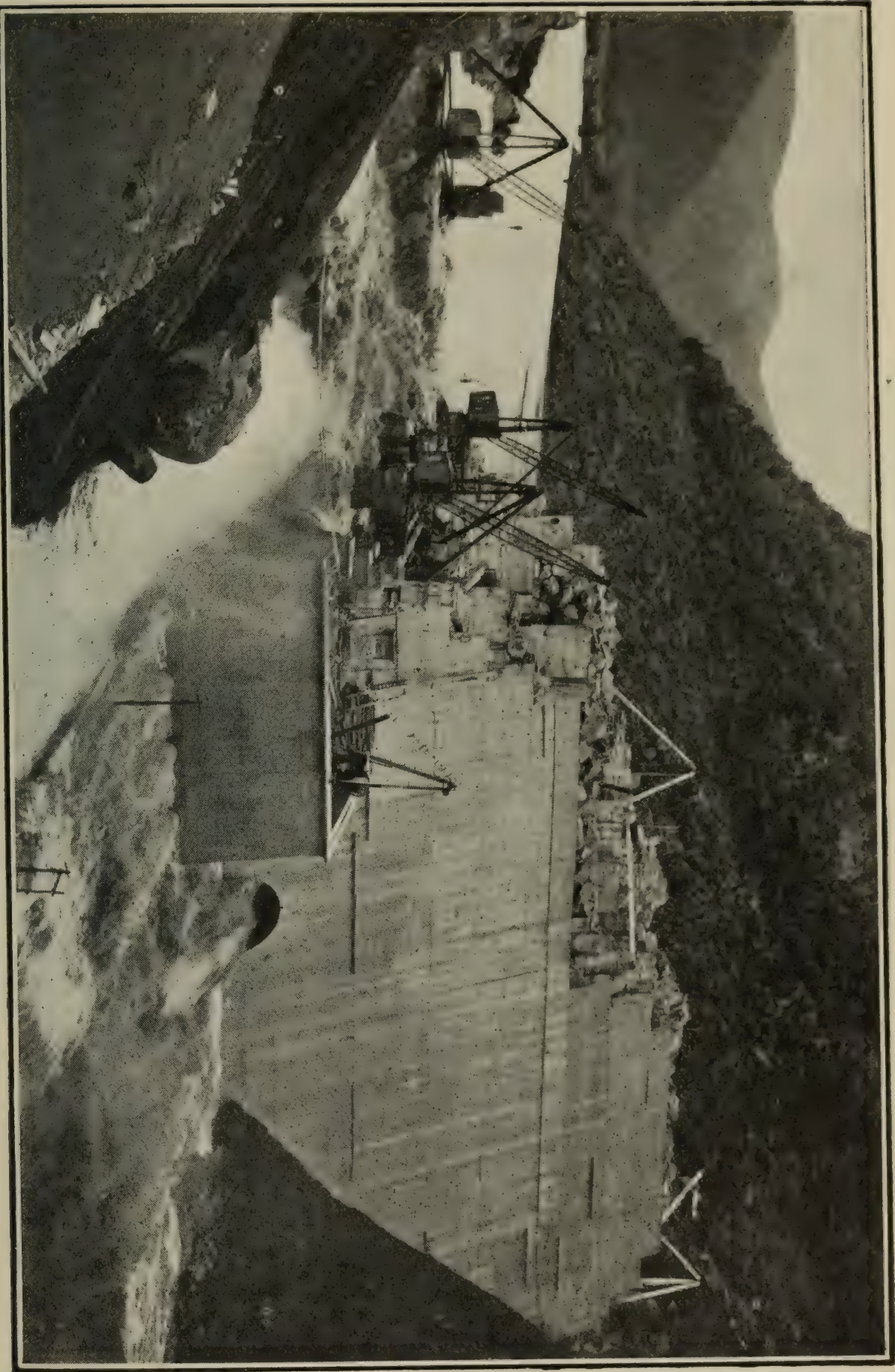
An irrigation settlement on the Murrumbidgee at Hay (established in 1892), comprises 3,000 acres. There the pumping plant and channels provide water for the growth of fodder plants for dairying, in addition to which a small area is devoted to the cultivation of vegetables.

Before the end of the year 1912, the New South Wales Government hopes to have completed the great Burrinjuck storage reservoir on the Murrumbidgee, about three miles

below the junction of the Goodradigbee. The central site of this enormous storage dam is a deep gorge where the Murrumbidgee is confined between two high walls of solid red granite—the majestic heights of Black Andrew Mountain on one side, while on the other the Burrinjuck Mountain towers 2,200 feet above the river bed. The catchment area above the dam is estimated at not less than 5,000 square miles, and the impounded water will be banked up along the Murrumbidgee, Yass and Goodradigbee, in some cases 50 miles, while the present maize flats surrounding the Murrumbidgee-Goodradigbee junction will be covered with water, when the dam is full, to a depth of 150 feet. The huge lake thus formed will then contain one and a half times as much water as Sydney Harbour, capable of covering, if evenly distributed, an area of 766,000 acres to a uniform depth of one foot.

The purpose of the Burrinjuck reservoir is to supply water in summer, early autumn, and other dry periods of the year to an extensive irrigation tract on the right bank of the Murrumbidgee, between Narrandera, Yanco, Whitton, and Carrathool on the south, and stretching north roughly to a line between Barellan and Gunbar. The Burrinjuck water will consist of (i.) Winter flood waters; (ii.) water derived from the melting snows in early spring, and (iii.) the ordinary flow of a 5,000 square mile catchment area.

These stored up waters, supplemented by the natural flow from the remaining 3,000 square miles of the Murrumbidgee catchment—contributed mainly by the Tumut, further down stream—will be allowed to run down the channel of the Murrumbidgee for a distance of 220 miles to another regulating storage dam called the *Berrembed Weir*, a few miles above Narrandera. From Berrembed the irrigation supplies will flow by gravitation on past Narrandera, partly through an artificially constructed canal 50 feet wide and 7 feet deep, and partly through the Bundidgerri Creek, until the first of the irrigable lands are reached. Thence it will be distributed over the irrigable



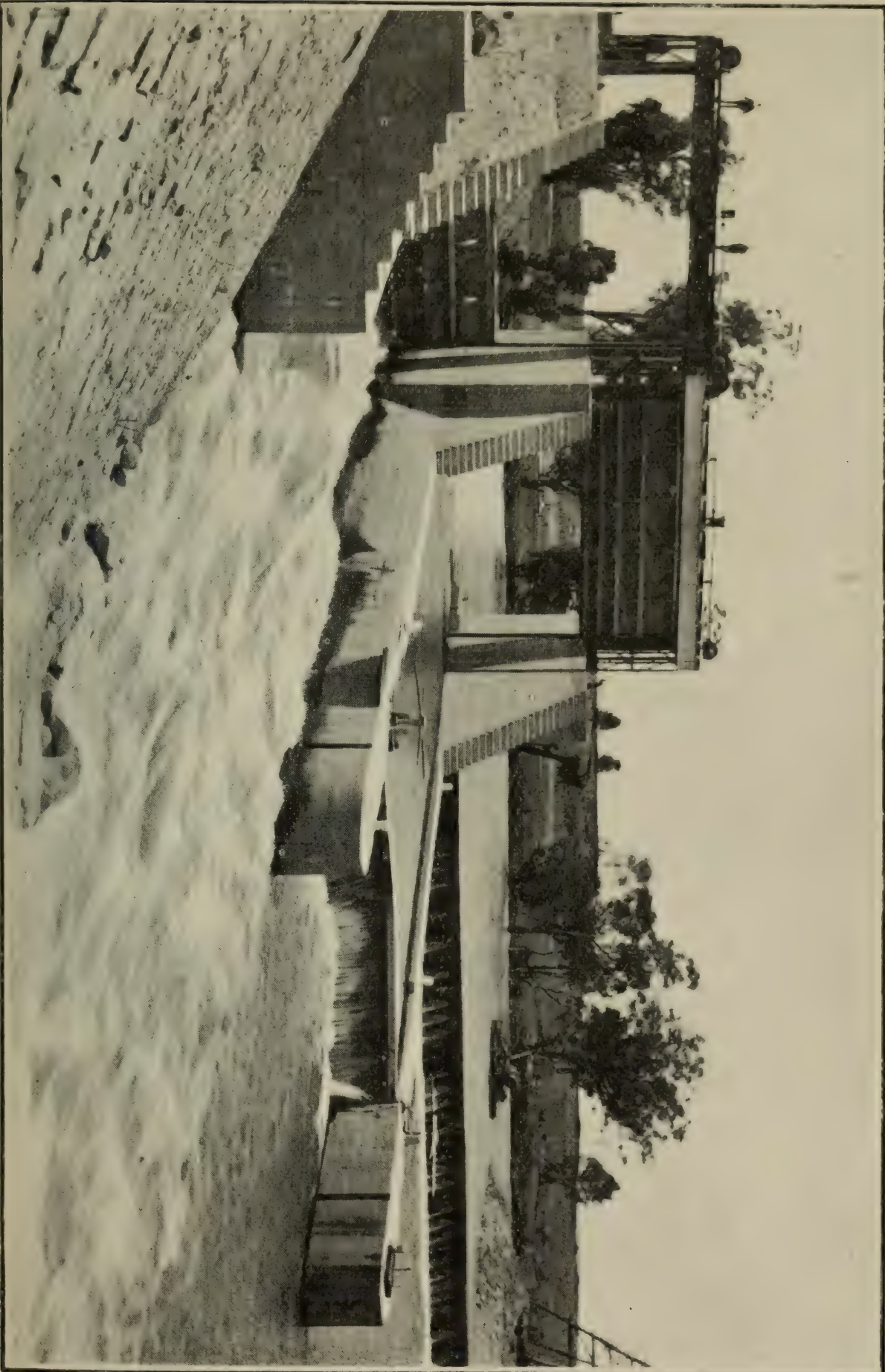
BURRINJUCK DAM—UPPER MURRUMBIDGEE RIVER.

areas by means of a series of mains and subsidiary channels which will carry the water to the highest point of each individual block of land to be irrigated. The main channel and the distribution are controlled by a series of regulators and escapes for the disposal of the water as may be desirable.

The New South Wales Government has acquired and subdivided the lands comprising the irrigable area, 2,000,000 acres of first-class and 360,000 acres of second-class land, in order that it may be occupied in the near future for the purposes of intense cultivation. Experts report it well suited for the growing of apples, apricots, peaches, plums, nectarines, walnuts, citrous fruits, grapes, olives, and figs. Plant growth continues throughout the whole year; six cuts of lucerne can always be relied upon in ordinary years, which may be increased to eight cuts in hot, dry years. The summer heat is dry, no enervating effects are felt, and labour may be carried on throughout the hottest days without bodily discomfort. The warm temperature and low humidity is especially favourable to fruit growing. Dairying is at present carried on successfully in the Hay district, which is much to the west of the areas to be irrigated by the Burrinjuck waters. There is a marked absence of stock diseases and fruit pests, which have to be contended with in the more humid coastal areas, and the rainfall (16 inches) is such as has been proved to permit of the successful growing of wheat.

The Government hopes to have 5,000 people settled on this irrigation area before the close of 1913, and it is anticipated that when the whole of the lands comprising the area are settled, there will be an addition of at least 50,000 people to the population of the district.

Water storage schemes such as Burrinjuck and others which must inevitably be established on other rivers of the Murray-Darling area clearly point to an enormous increase in population not only in Riverina, but in other parts of the western plains, during the next few decades.



BERREMBID WEIR ON MURRUMBIDGEE RIVER, ABOVE NARRANDERA.

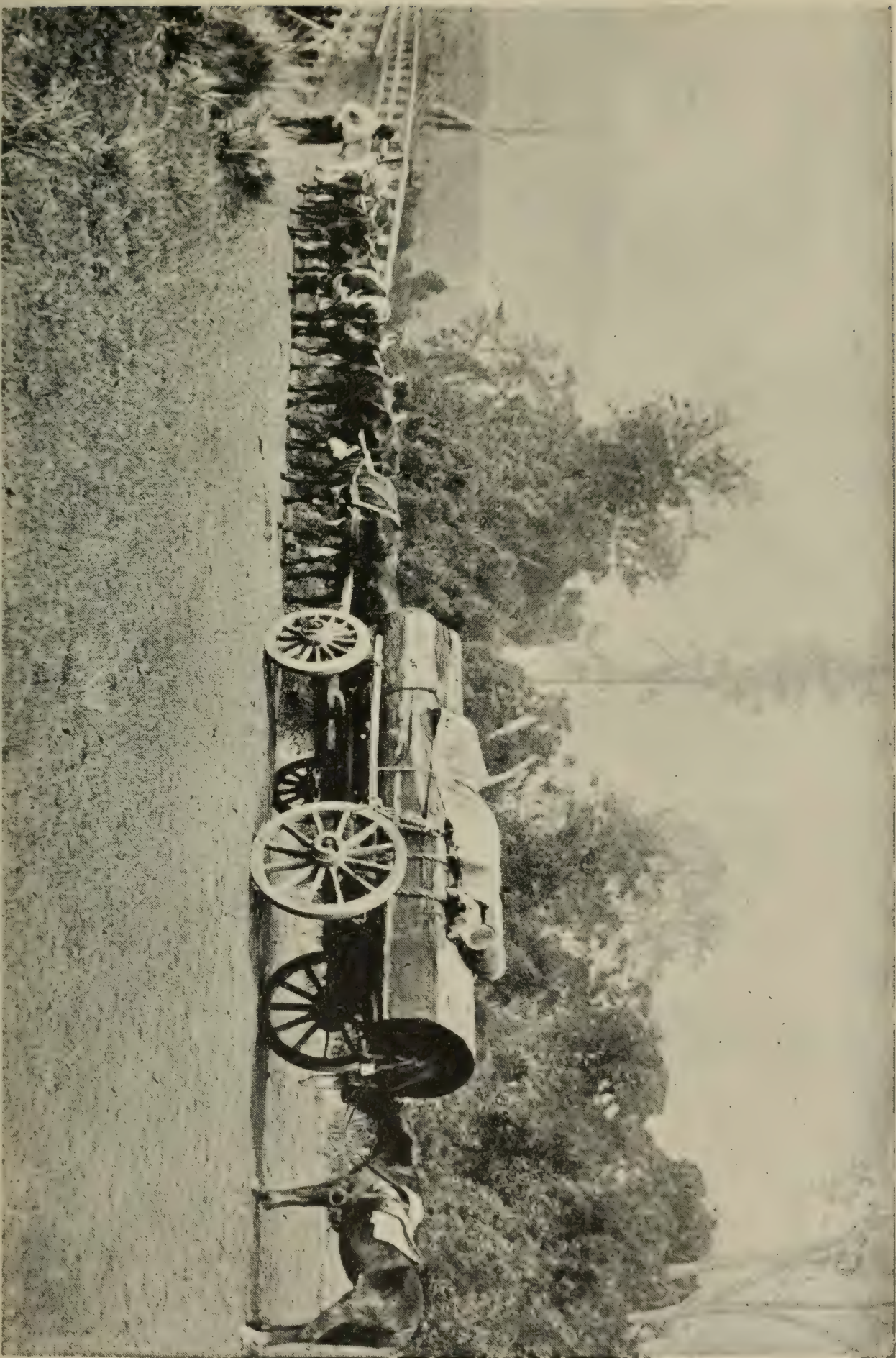
RIVERS OF THE EASTERN SLOPE.

The TWEED drains the north-east corner of the State, and is flanked throughout by lovely scenery. It consists of the North, South, and Middle Arms, the first and last of these rising in the Macpherson Range, while the South Arm has its source near *Mount Burrell*, in a low range forming a watershed between the Tweed and the Richmond. After an easterly course of 40 miles the Tweed enters the Pacific near Point Danger. Vessels drawing not more than six feet of water can trade to this river, but shipping is greatly hampered by the shifting nature of the bar at its mouth. Ocean-going boats have to anchor inside the heads, whence river boats of light draught ply to Murwillumbah daily.

Fine dairy-farming land occupies most of the Tweed basin; coffee, sugar-cane, pineapples, bananas, and other semi-tropical fruits are grown successfully, and the indigenous vegetation is rich and tropical. The rainfall is abundant, and the chief exports of the district are butter, live-stock, potatoes and timber. The chief town on the Tweed is Murwillumbah, the northern terminus of the North Coast Railway. An extensive tourist traffic passes down the lower Tweed from Murwillumbah to Tweed Heads, where thousands of pleasure-seekers indulge in surfing during the summer months. Much of the produce of the Tweed is shipped at the thriving seaport of Byron Bay. The steamers from Byron Bay tranship butter direct to the large ocean liners, as they lie alongside the Sydney wharfs taking in other cargo for the European market.

The BRUNSWICK (35 miles), rises in a ridge known as the Koonyun Range, running north-west from Byron Bay, and enters the sea seven miles north of Cape Byron. Its entrance is shallow, and the largest settlement on its banks is Mullumbimby.

The RICHMOND (160 miles), is a fine stream watering a rich and flourishing district noted throughout the State for its wealth in "pigs, poddies, and paspalum." It consists



Copyright Photo.

HAULING CEDAR TO PORT—RICHMOND RIVER.

Kerry, Sydney.

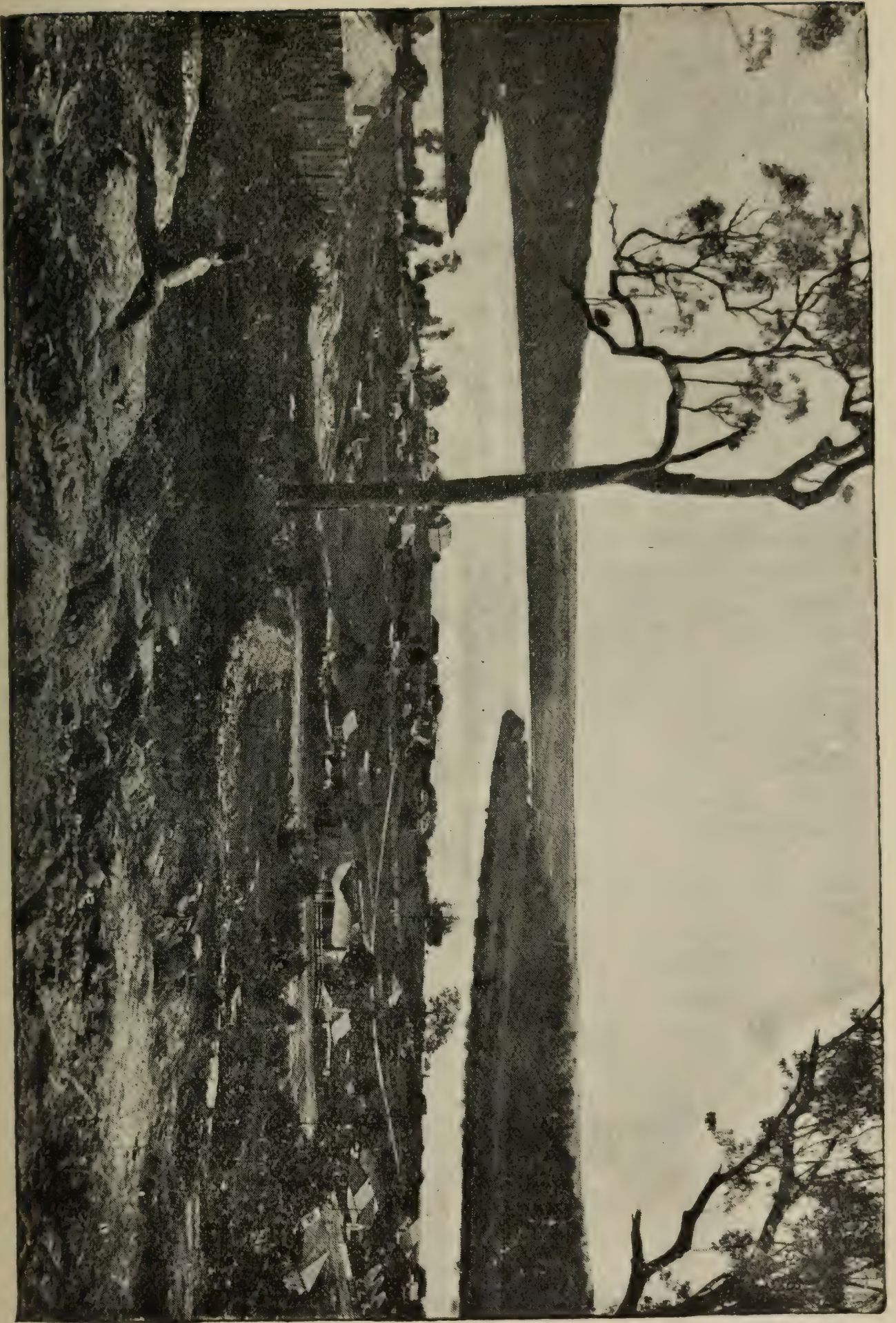
of three branches—the *Main*, *North*, and *South* Arms. The first of these rises in the slopes of Mount Lindsay, the highest peak of the Macpherson Range, and flows almost south-east as far as Casino, and thence east till it enters the Pacific at Ballina. The Main Arm is navigable for small produce craft as far as Lismore, 65 miles from the sea. The river was first explored in 1850 by sawyers in search of cedar, and for many years afterwards its only exports were cedar, ironbark, tallow and hides. The brushes of the Richmond have yielded the best cedar ever obtained in the State, and more timber has been sent away from this river than from all the rest of the New South Wales rivers. The upper course of the Richmond lies among rugged pastoral country and heavily-timbered uplands, but the lower portion of its basin consists of a rich alluvial district, where the products of semi-tropical climes grow luxuriantly. Between Ballina and Lismore, and extending east to Byron Bay, and north to the Macpherson Range, lies an extensive elevated tract of country of remarkable fertility. Up to a few years ago this region was known as “The Big Scrub,” and was clothed with splendid timber and an almost impenetrable jungle growth. The jungle and most of the timber have now given place to paspalum paddocks on which splendid herds of dairy cattle are depastured. Butter, bacon, hides, tallow, potatoes, timber and fish are the chief exports from the Richmond basin.

A bar, which is crossed with difficulty in stormy weather and during easterly gales, obstructs the entrance.

The chief centres of settlement in the Richmond district are Lismore, Kyogle, Casino, Alstonville, and Ballina.

The CLARENCE is the largest and finest of the northern rivers. Its length is 190 miles, and the area of its basin is estimated at little short of 8,000 square miles. Its furthest source is *Acacia Creek* (a tributary of the *Maryland*), which rises in the slopes of *One Tree Hill*, a prominent peak in the Macpherson Range, whence the three main head streams of the Clarence—viz., the *Maryland*,

THE CLARENCE RIVER NEAR MACLEAN.



Boonoo Boonoo, and *Koreelah*, converge to a place called Rivertree. Below this point the united stream—now known as the Clarence—flows south-east till it receives the *Timbarra* from the New England Range. It then turns south and receives on its right bank the united waters of the *Mitchell*, the *Boyd*, the *Nymboida*, *Guy Fawkes* and *Sara*, the first of which rises in the New England Range near Ben Lomond, while the *Nymboida* has its origin in the low range dividing the Bellinger and Clarence basins. Some distance below its junction with the *Mitchell* the Clarence bends to the east, and after receiving the *Orara* and some smaller streams from the south, enters the sea at Shoal Bay. The entrance has been greatly improved of late years, and now carries a depth of from 16 to 18 feet of water. For a distance of 70 miles from the sea the Clarence is a magnificent stream, averaging half a mile in width, and is navigable for ocean-going steamers (drawing not more than 11 feet of water) as far as Grafton, 45 miles, and for smaller vessels to Copmanhurst (the head of navigation), 67 miles from Shoal Bay. The upper basin of the Clarence is extremely rugged, but as the river approaches the sea it broadens into a number of picturesque lake-like expansions (*e.g.*, *The Broadwater*), and Woodford, Chatsworth, Harwood and Palmer Islands are met with within its estuary.

Fine fields of maize, sugar-cane, millet, lucerne, and potatoes line the banks of the Lower Clarence, and the whole district is regarded as one of the richest dairy-farming areas in the State. Gold and copper are obtained in the vicinity of the *Orara* River and the *Bucca* and the *Nana* Creeks, within the Clarence basin; hardwoods are exported largely to the Sydney market and to New Zealand; while the prosperity of the Clarence district generally depends upon its output of butter, maize, sugar, potatoes and fish.

In addition to Grafton, the centre of the trade, many other townships are situated on its banks, viz., Copmanhurst, Ulmarra, Lawrence, Maclean, and Yamba.

The BELLINGER (60 miles), and the NAMBUCCA, are two small rivers about nine miles apart between the *Clarence* and *Macleay*. Both have their source in the North Coast Range. Ironbark railway sleepers, tallow-wood, box, and other timbers, together with butter, potatoes, and maize, are the chief products of the surrounding districts, but the nature of the entrance to each of these streams confines the shipping to vessels of small tonnage. The Nambucca is navigable for vessels of light draught as far as Bowraville, 30 miles from the sea, and its chief tributaries are Taylor's Arm and Algomera Creek. The principal feeder of the Bellinger is called the South Arm.

The MACLEAY is formed in the main by the waters of the *Guyra*, *Chandler*, *Salisbury Waters* and the *Apsley*. The *Guyra* rises in the New England Range, near Ben Lomond, and flows south and south-east for over 60 miles through splendidly-timbered country, being joined on its left bank by the *Chandler River*, which rises at *Chandler's Peak*, in the *Macleay Range*. The *Apsley*, the southern branch, is a fine stream, rising in the upper portion of the *Hastings Range*. The upper course of the *Apsley* is wildly rugged, and is marked by a series of magnificent cascades, the greatest of which has a drop of 240 feet. Some distance below this fall the bed of the river lies between perpendicular sandstone cliffs, which form the sides of an enormous canyon, similar in formation and general appearance to the valleys in the *Blue Mountains*. *Oxley*, who came upon this depression during his second journey in 1818, thus describes it:—"This tremendous ravine runs nearly north and south; its breadth at the bottom does not apparently exceed 100 or 200 feet, whilst the separation of the outer edges is from two to three miles. In perpendicular depth it exceeds 3,000 feet. The slopes from the edges were so steep, and covered with loose stones, that any attempt to descend them even on foot was impracticable." After its junction with the *Guyra*, the united waters flow east under the name of *Muddy River*, till they are joined by the *Chandler*. Below this point the stream—now known

as the Macleay—flows east, receiving the Belmore tributary at the township of Gladstone, and finally enters the sea at Trial Bay. A new channel, made by the great flood of 1893, now forms the only practicable entrance to the river.

The length of the Macleay is estimated at 160 miles, and its drainage area is about 460 square miles. Its lower basin consists of rich alluvial flats, yielding maize, potatoes, citrous fruits, and dairy produce in abundance.

Vessels drawing seven feet of water can trade to this river, which is navigable as far as Greenhills, a township 30 miles from the sea. The chief towns on the Macleay are Kempsey and Frederickton.

The HASTINGS rises in the Hastings Range, and after a course of 110 miles through rich undulating country, well-timbered with cedar and mahogany, flows into the sea at Port Macquarie. It passes in the lower parts of its course through flats devoted almost entirely to dairy-farming and the growing of maize. Hardwood sleepers form an important export from this part of the State.

The chief tributaries of the Hastings are *Wilson River*, *Forbes River* and *Morton's Creek* on the left bank, and *Ellenborough River* and *Thone Creek* on the right.

The MANNING has its source in the Mount Royal Range. It flows in the main easterly, and after a course of 150 miles, enters the ocean by two mouths, the Harrington and Farquhar Inlets. The latter of these channels has not been used by steamers for many years. Harrington Inlet being the safer port and less obstructed by sandbanks. Vessels of seven feet draught can trade to Wingham, 30 miles inland, where the fresh river water mingles with the tidal waters of the ocean.

The Manning receives on its right bank the united waters of the *Barrington*, *Gloucester* and *Avon Rivers* from the Mount Royal Range and its offshoots, but its largest tributary is the *Barnard*, which has its source near Ben Hall's Gap, close to the eastern extremity of the Liverpool Range, and about 12 miles south of Nundle. The

Nowendoc, Rowley's, Lansdowne, and other small streams also join it on the left bank.

The Manning basin, estimated at 3,000 square miles in area, consists in its upper portion of undulating and densely-wooded tracts, while along its banks as it approaches the sea, flourishing dairy farms meet the eye in all directions.

The delta formation at its mouth consists of Mitchell, Oxley, Jones and Dumaresque Islands. The chief towns on the Manning are Taree, Wingham, Tinonee and Cundletown.

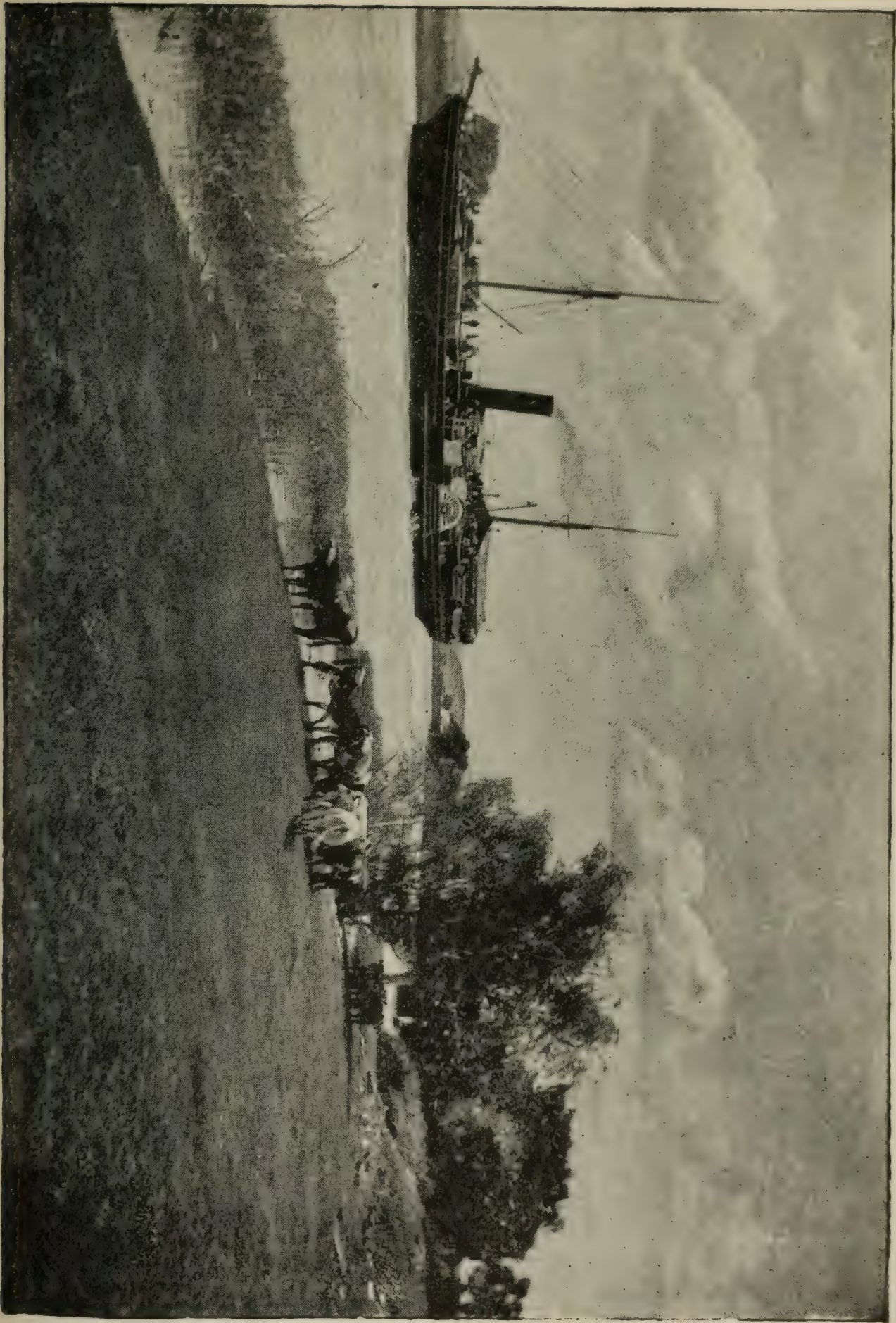
Butter, maize, potatoes, oysters, marble and lime are the chief products of the Manning district.

The KARUAH rises in the Mount Royal Range, and after a course of 50 miles in a southerly direction, through good agricultural and pastoral country, discharges into Port Stephens. It flows past the township of Stroud, and is fed by the *Deep, Lawler, Pipeclay* and *Limeburner's Creeks*.

The HUNTER is one of the most important rivers in the State. It was named after Governor Hunter, during whose administration it was discovered by Lieutenant Shortland (1797). It rises in the Mount Royal Range within a mile or two of the source of the Manning. It flows first south-west (receiving *Page's River* from the Liverpool Range above Murrurundi), past Muswellbrook and Denman, and is joined about three miles below the latter by the Goulburn, which issues from the Main Range about 20 miles north-east of Mudgee. Below the Goulburn junction the river flows east, and finally enters the sea at Newcastle. Its length is 340 miles, and its tributaries are—in addition to the Goulburn—the *Williams*, the *Paterson* and the *Wollombi*, besides numerous smaller streams from the Mount Royal, Liverpool, and Hunter Ranges. The main stream is navigable for fairly large ocean-going steamers as far as Morpeth, 35 miles from the sea, while small produce craft ascend the Williams and Paterson, the former from Raymond Terrace to Clarence Town (20 miles), and the latter from Hinton to Paterson (18 miles). The upper valley of the Hunter is hilly, but its lower

portion consists of rich low-lying alluvial flats, many parts of which, near the river banks, possess soil of great fertility. In the upper Hunter basin, sheep-farming and dairying are the chief industries of the people, while in the middle and lower basins extensive vineyards form a striking feature of the landscape. The lower Hunter valley is also the most productive coalfield of Australia. The alluvial flats of the lower Hunter are noted for their yield of lucerne, millet, potatoes and vegetables, but they are, unfortunately, liable to be flooded in times of long-continued rains. The most disastrous of these inundations was that of 1893, when, owing to the sudden and simultaneous swelling of both its upper and its lower tributaries, almost the whole of the district between West Maitland and Newcastle was converted into an inland sea, and hundreds of settlers were rendered homeless. During this flood, the trains had to cease running for several days, and communication was kept up with Newcastle only by means of small boats which ran great risk of being swamped by colliding with trees, floating haystacks, buildings, and dead cattle. A few miles above its mouth the Hunter is divided into two channels by Ash, Dempsey, Mosquito, Spectacle, and Bullock Islands. These channels unite, however, near the sea, and form the busy coal port of Newcastle. On the banks of the Hunter, the largest centres of settlement are West Maitland, Singleton, and Muswellbrook. Morpeth is at the head of navigation, Hinton is at the junction of the Paterson and the Hunter, while at Raymond Terrace the Williams joins the main stream. The lower basin of the Hunter from Newcastle inland to beyond West Maitland was at one time a vast estuary, which has long since been filled up by the alluvial deposits of ages.

Coal, hay and wines are the products on which the industrial reputation of the Hunter Valley firmly rests. "The wines of the Hunter River Valley," wrote a well-known expert, "have ere now made a name for themselves. The clarets, hocks, Chablis, and Sauternes of the Hunter Valley are delicious, have gained recognition at several



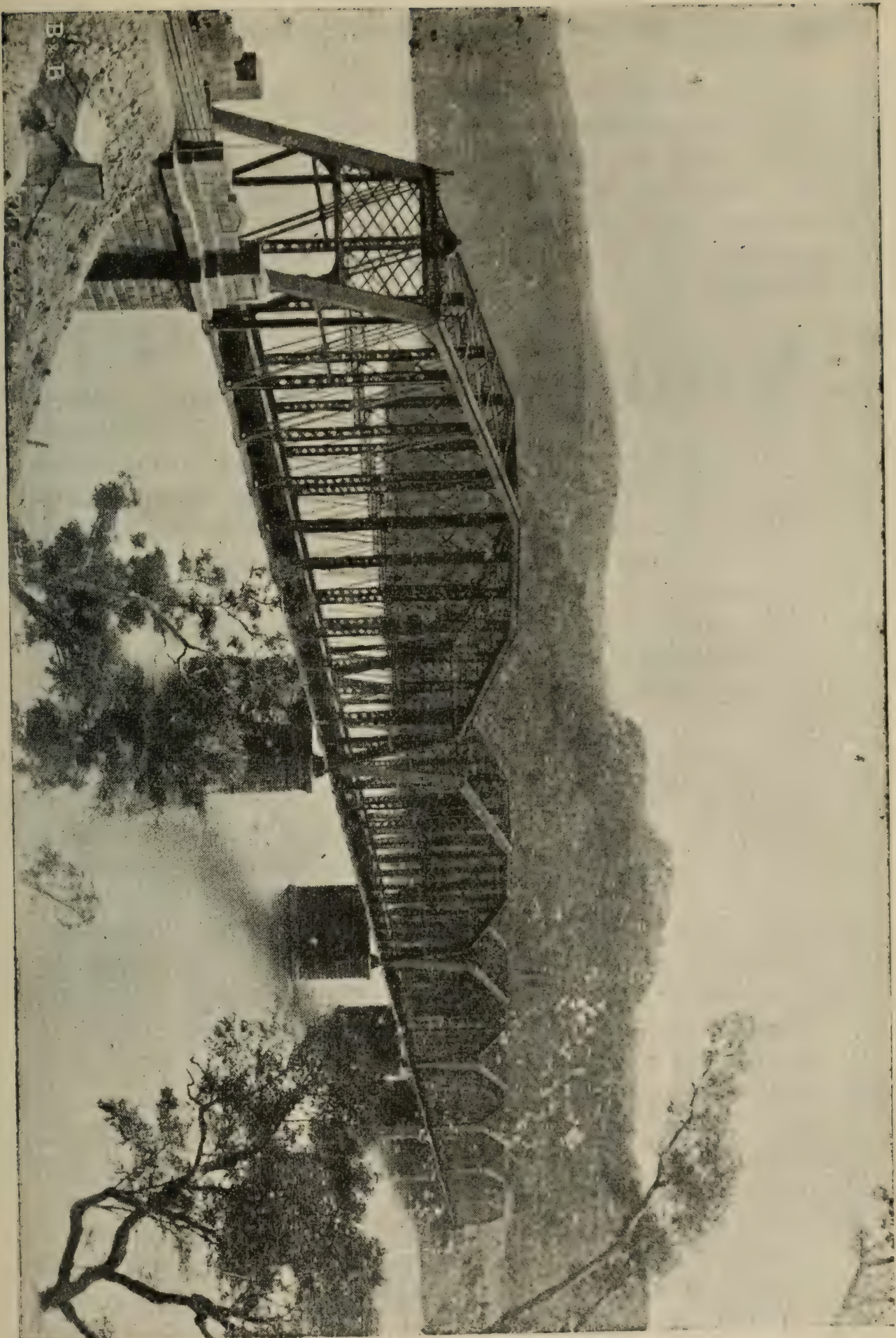
THE HUNTER RIVER NEAR MORPETH.

international competitions, and compare with the choicest vintage of any other country." The water supply for Newcastle and the mining towns adjacent thereto, as well as for Maitland and the towns of the South Maitland Coalfield, is drawn from the Hunter, whence it is pumped in the first instance into reservoirs and filter beds at Walka (close to West Maitland). From Walka the water is pumped to huge reservoirs at East Maitland and Buttai (south of Maitland, and 300 feet above sea-level), whence it flows by gravitation to its various destinations.

The HAWKESBURY drains a large tract west and south-west of Sydney. The different names by which various portions of this stream are known were bestowed by the early explorers, who were not aware that the streams they discovered were in this case parts of the one river.

It rises, in the first instance, under the name of the *Wollondilly*, at Mount McAlister, in the Cullarin Range, about 20 miles north-west of Goulburn, and flows south and east towards that city, watering the rich and well-known Goulburn Plains. On the outskirts of Goulburn it receives the *Mulwarree* from the south, and soon afterwards turns north, receiving on the left bank the *Cookbundoon* from the Main Dividing Range, and on the right the *Wingecarribbee* from the western flanks of the Illawarra Range. The *Wollondilly* then flows through the picturesque sunken valley of Burragorang, receiving on its way the *Nattai* and a few smaller streams. After leaving this valley it receives from the west *Cox's River*, which drains the southern portion of the Blue Mountains; and below the junction of this tributary the main stream becomes known as the *Warragamba*. Under this name it flows north-east for some distance till it is joined by the *Nepean*, which brings as its tribute the combined waters of the *Cordeaux*, *Cataract* and several other streams, all having their origin in the western slopes of the Illawarra Range, some of them at points distant only two or three miles in a direct line from the coast.

It would be hard to find scenery more beautiful than



B. 15

that which graces the junction of the Nepean and the Warragamba (where the Blue Mountains close in upon the river), while the latter winds round about all the points and corners "as though loath to leave places so pleasant." Though smaller than the Warragamba, the Nepean gives its name to the whole stream, which now flows north, skirting the Blue Mountains, and then through rich alluvial flats devoted mainly to dairy-farming, fruit-growing, and the cultivation of maize and lucerne. In this part of its course the Nepean receives from the Blue Mountains the *Grose* and the *Colo*, and from the Grose junction the river for the first time becomes known as the Hawkesbury. From the Colo junction it flows north till it receives on its left bank the waters of a fine stream—the *Macdonald*—below which its general direction is eastward till it enters the ocean at Broken Bay.

The total length of this river is 335 miles, and its drainage area is estimated at 8,000 square miles. The estuary of the Hawkesbury forms a fine harbour with two extensive branches, Brisbane Water and Pittwater. Small cargo boats ascend the river to Sackville Reach (10 miles below Windsor and 70 from the sea), and return laden with dairy produce, fruit, and vegetables, while tourist steamers and launches flit over the lower reaches during the summer months. The scenery amid the wild, broken country in the lower Hawkesbury, where rocky bluffs rise steep and precipitous from the water's edge and the shores are pierced by numerous winding offshoots, is picturesque and beautiful. This portion of the Hawkesbury has struck several travellers from foreign parts as bearing a strong resemblance to the Rhine.

Writing about it, Anthony Trollope remarked:—"The Hawkesbury has neither castles nor islands, nor has it bright, clear water like the Rhine. But the headlands are higher and the bluffs are bolder, and the turns and manœuvres of the course which the waters have made for themselves are grander, and, to me, more enchanting than those of the European river." About eight miles above its

mouth the Hawkesbury is crossed by a fine seven-spanned iron bridge, belonging to the Great Northern Railway System.

The people of Sydney and its suburbs depend for their water supply on the Upper Nepean—the huge dam on the Cataract branch, about four miles from Appin, and the immense reservoir at Prospect forming favourite places of interest for tourists.

GEORGE'S RIVER (50 miles), rises in the western slope of the Illawarra Range not far from the township of Appin, flows north through somewhat indifferent country to within a little over a mile of Campbelltown, thence northerly past Liverpool, beyond which it bends east and empties into Botany Bay. It is crossed by the South Coast Railway at Como. It receives numerous small streams, the chief of which is the *Woronora*. Small boats can ascend the stream as far as Liverpool.

The SHOALHAVEN, whose estuary was discovered by George Bass during his whaleboat expedition in 1797, is the largest stream on the coast south of Sydney. It rises in the Eurambene Mountain, in a spur which leaves the Gourock Range in latitude 36° S. It flows first north, draining that part of the Southern Tableland which lies between the Gourock and Currockbilly Ranges. On reaching the northern extremity of the latter it turns sharp to the east, and, flowing through rich low-lying agricultural and dairy-farming lands, empties into the ocean by a wide, shallow estuary. In its upper course the Shoalhaven flows through wild mountain country and deep gullies, many of which descend nearly 1,500 feet, and are marked by fine scenery. The Shoalhaven Gullies are also gold-bearing.

A canal, which is continually being broadened by the erosive action of the river current, connects the Shoalhaven with the Crookhaven, five miles further south, and through this a considerable part of the waters of the main stream reach the ocean. The length of the river is estimated at 220 miles, and its chief tributaries are the *Jembaicumbene*, *Mongarlowe*, *Corang*, *Endric*, and *Kangaroo Rivers*, while

near the sea it is joined by *Broughton Creek*. On account of a bar and numerous shallows, navigation is confined to small steamers, which trade as far as Greenwell Point, on the Crookhaven, three miles from the sea and 10 miles below Nowra, of which it forms the port. Nowra, not far from Bomaderry, the present terminus of the South Coast Railway, is the largest town on the Shoalhaven. Here the stream is spanned by a fine bridge, 1,230 feet long.

The CLYDE rises in the Pigeon House Mountain, and, after flowing south for 80 miles through rich undulating country, empties into Bateman Bay. It is fed by the *Cockwhy*, *Currowan*, *Nelligen* and *Buckenbowra Creeks*, and small craft can trade a few miles up the river. The upper basin of the Clyde is auriferous, while the flats skirting its lower course are devoted to dairy-farming and agriculture. Bateman Bay and Nelligen are towns of importance on the Clyde, which is also the outlet by water for much of the produce of the Araluen, Braidwood and Queanbeyan districts.

The MORUYA is formed by the united waters of the *Deua River* (its principal branch) and *Araluen Creek*. The former rises about seven miles north-west of Nerri-gundah, and flows north to its junction with Araluen Creek. The latter stream rises in the mountainous district near Araluen, and drains the Araluen Valley. In the lower part of its course, the Moruya flows through country devoted to farming and dairying, and enters the sea by a wide estuary, which, on account of shoals and sandbanks, is of little use for shipping. The length of the Moruya, including the Deua branch, is about 80 miles. The much admired granite columns on the George-street and Martin Place sides of the Sydney Post Office were obtained from a quarry on the Moruya.

The TUROSS rises in the Barren Jumbo Mountain, a bare, rocky peak in the Gourock Range, and, after flowing in a north-east direction for 70 miles, enters the sea by a wide, bar-imposed estuary.

This river flows in its upper course through an

abandoned goldfield, while the lower portion of its basin consists of rich alluvial country, splendidly grassed and timbered, and well suited for dairy-farming.

The BEGA is formed by the junction of the *Bemboka* and *Brogo Rivers*, which unite at the town of Bega. Thence the river flows eastward to the ocean, which it enters near Tathra. The Bemboka, which is the longer branch, rises in the South Coast Range near Mount Nimitybelle, and flows through rich farming and dairying country. The estuary of the Bega is only navigable for small craft, and the total length of the stream is 55 miles.

The TOWAMBA is a fine stream 50 miles in length, rising in the South Coast Range and flowing south-easterly into the southern arm of Twofold Bay. The chief feeders of this river are the *Wog Wog*, *Jingo*, and *Matagana Creeks*. Boydtown, the seat of a once flourishing whaling industry, but now an almost abandoned settlement, stands near the estuary of the Towamba. The basin of the river consists of good dairying and agricultural country.

THE RIVERS OF THE SOUTHERN SLOPE.

The SNOWY RIVER drains that portion of the Southern Tableland lying near the south-east corner of New South Wales, and bounded on the east, north, and west by the South Coast, Monaro, and Muniong Ranges respectively. This river rises on the slopes of Mount Kosciusko, flows north till it receives the *Eucumbene*, then sweeps first south-east and afterwards south-west till about 18 miles from The Pilot it crosses the southern boundary of the State, whence its course is south through Gippsland, to the Tasman Sea. Its total length is probably about 265 miles, 170 of which belong to New South Wales. It is in the main snow-fed, and its flow is liable to sudden changes from the rains and the melting of the snow on the high mountain slopes by which it is flanked. Its upper basin is in parts gold-bearing, and is devoted chiefly to sheep and cattle raising, but is far too rugged for farming. Its chief tributaries are the *Eucumbene*, *Crackenback*, *Mowamba*, and

Jacobs Rivers, from the Muniong Range; the *Bobundara*, and *McLaughlin*, from the Monaro Range; and the *Bombala* and its tributaries, from the South Coast Range. The chief centres of settlement in the New South Wales portion of its basin are Bombala, Delegate, and Buckley's Crossing.

THE RIVERS OF THE WESTERN SLOPE.

The MURRAY, judged by its length and the area of its catchment, should rank as one of the great streams of the world. Its volume, however, is not in keeping with its immense gathering ground. Nevertheless, it is the greatest permanent waterway in all Australia. Its vast basin includes the whole of the western portion of New South Wales, stretches north into Central Queensland, and embraces a very large portion of northern Victoria. The Murray, in its upper course, is made up of three branches—the *Indi*, the *Hume*, and the *Tooma*. The *Indi*—the longest branch—rises in a gully near The Pilot, at an elevation of 5,000 feet above sea-level; while the other two branches have their respective sources in the western and northern slopes of Mount Kosciusko. From the confluence of these three streams, the Murray descends towards the alluvial plains below Albury, receiving numerous mountain torrents. Thence, after holding a westerly course as the southern boundary of the State, and receiving the *Murrumbidgee* and *Darling* on its right bank, and the *Ovens*, *Goulburn*, *Campaspe* and *Loddon* on the left, it passes into South Australia, eventually discharging its waters into Lake Alexandrina, whence it debouches into the Southern Ocean west of the Coorong Coast. Lake Alexandrina, which thus receives equally the snow-waters of Kosciusko and the tropical downpours of Queensland, is a wide stretch of water, six to ten feet deep, on which the voyager is often out of sight of land. It is of interest to know that under the briny waters of Lake Alexandrina, below the strata on which they rest, borings disclose an abundant supply of good artesian water, derived doubtless from the water-

bearing beds of Queensland and New South Wales, whence they have worked their way underground to the ocean.

From its farthest source at the foot of The Pilot to the town of Albury, the Murray has a length of about 250 miles; thence to the Darling River junction its course is 800 miles; and from that point to the sea, below Lake Alexandrina, it is 550 miles in length. The river has thus a total course of 1,600 miles, of which 1,200 are within New South Wales.

Of all Australian rivers it has the greatest volume of water, fed as it is by the snows and rains of the Kosciusko Plateau, and it has never been known by either blacks or whites to stop running.

The fall of the Murray between Albury and the Darling junction is less than six inches in the mile, and this circumstance, as well as the loose nature of the soil, has led, in the course of ages, to the formation of a network of anabranches, intersecting the country in every direction between the Murray and the Murrumbidgee. The largest of these is the *Edward River*, which, after an independent course of 150 miles, receiving on its way the united waters of *Yanko Creek* and the *Billabong*, returns at length to the main stream a few miles above the Murrumbidgee junction. The *Edward River* and the *Billabong* and *Yanko Creeks* carry into the Murray a large portion of the drainage of Riverina.

In the upper part of its course the river flows through high, rocky cliffs, where the Murray Gates (a perpendicular chasm in the mountains) overhang the infant stream 3,000 feet. The lower basin of the river is devoted to sheep-farming, wheat-growing, dairying, and the raising of grapes and stone fruits. Large forests of red gum extend for some distance inland from both banks of the river to the boundaries of tracts subject to flooding, while beyond the plains are dotted at intervals with clumps of box trees and Murray pine.

In its lower course the Murray is flanked in many places

stoppage
D. & 12

by extensive low-lying, reed-studded swamp-lands, all of which in time to come will doubtless be made the home of thousands of prosperous settlers—for experiment has shown that these swamps, enriched by the nitrogenous silts of ages, can be cheaply drained and converted into some of the finest of farm lands. At present they are merely the haunt of wildfowl—the black swan, the wild duck, the pelican, the ibis, and the plover.

Two important and successful irrigation settlements—*Mildura* on the Victorian side, and *Renmark* in South Australia—are on the banks of the Murray. These settlements stand out as object lessons to all Australia as to the value of water conservation in promoting settlement in apparently unpromising districts.

Below Albury the most important centres of settlement on the banks of the Murray are Corowa, Echuca, Swan Hill and Wentworth (at the junction of the Darling), with Kingston, Gillen, Mannum and Murray Bridge in South Australia. Wide extended reaches fringed with willows and alive with wildfowl mark the low-lying tract where the Murray discharges into Lake Alexandrina. The navigation of the Murray is largely controlled from the South Australian towns along its lower course. The stream is navigable for large river boats as far as Wentworth for about seven months of the year, and for smaller craft as far as Albury almost throughout the whole year. In its lower reaches in South Australia the river is wide enough and deep enough to float a gunboat, and when traffic is in full swing scores of steamers may be seen churning out their eight to ten miles an hour as they toil up-stream, laden with stores and building material for the inland settlements, to return with heavy loads of wool, wheat, potatoes, ores, and other products of Riverina and the lower Darling.

The drainage area of the Upper Murray, with a mean rainfall of 40 inches, forms one of the most valuable water catchment tracts in the whole continent. There is no other part of Australia, with the exception of portions of the catchments of the Murrumbidgee, where snow falls in

sufficient quantities to have any marked influence upon the flow of the streams.

Above Albury, the hills enclosing the river valley are generally about half a mile apart. Below that point they recede, and seven miles below Albury the last of them is seen. Thence, throughout the whole of its course to the sea, the river flows through what may be termed level country, its fall being nine inches per mile from Albury to Tocumwal, $7\frac{1}{4}$ inches from Tocumwal to EchUCA, $4\frac{1}{2}$ inches thence to Euston, $3\frac{3}{4}$ inches to Wentworth, where it is joined by the Darling, and from Wentworth to Lake Alexandrina under 3 inches per mile.

The Murray was discovered by Hume and Hovell in 1824, who crossed it a little north-east of Albury. It then received the name of the Hume. It was subsequently explored in 1829 by Captain Sturt, from the Murrumbidgee junction to Lake Alexandrina. It was Sturt who, in honour of Sir George Murray, at that time Secretary of State for the Colonies, gave the river the name it now bears.

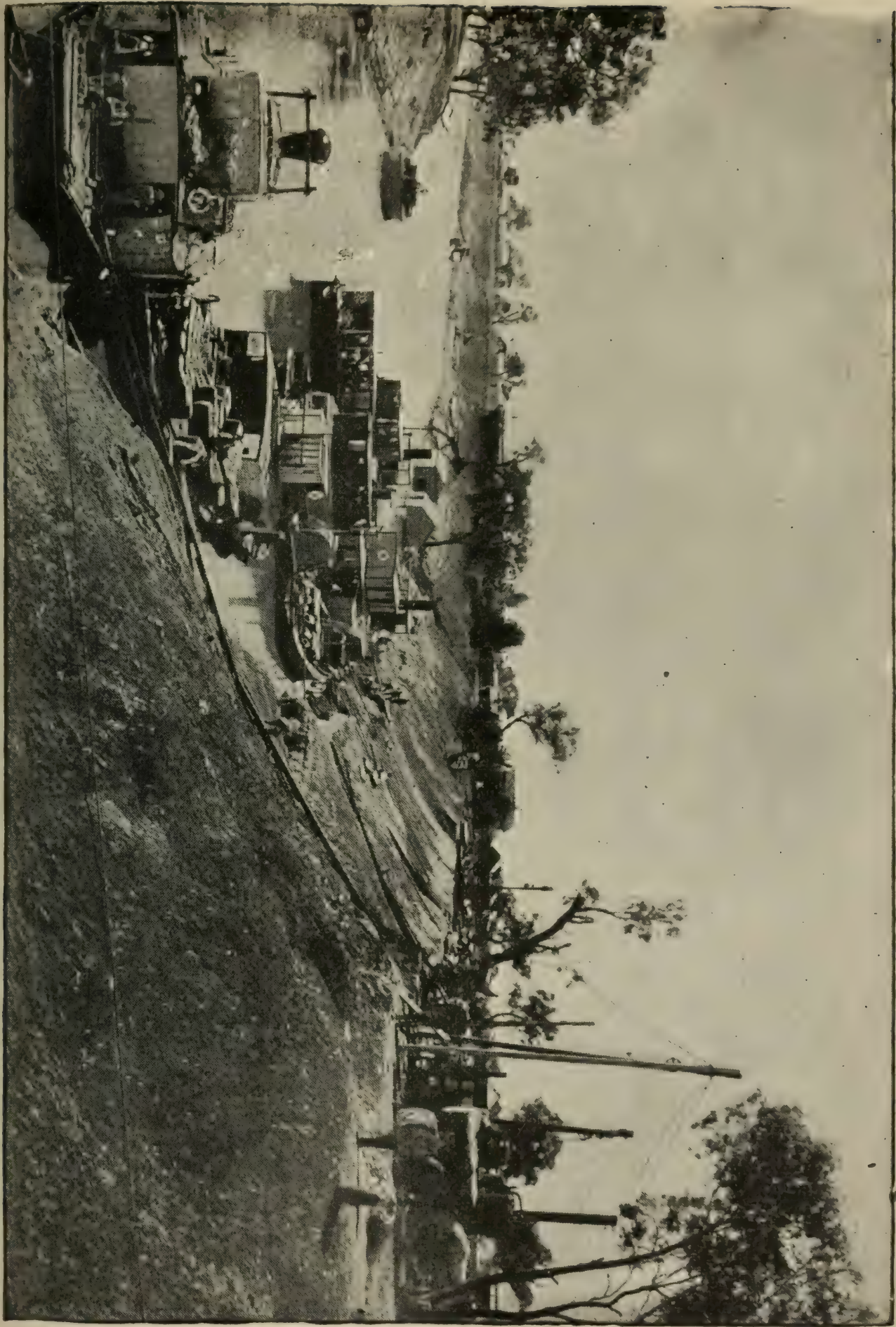
The DARLING is formed by the union of several streams which drain an extensive basin, stretching from the latitude of Bathurst northward into Queensland. This great water-course, like most large Australian rivers, is known by different names in different parts of its course—indeed, it is called the Darling only below the Bogan junction. Its remotest feeder is the *Condamine*, which springs from the western flanks of Wilson's Peak, near Warwick, on the Darling Downs (Queensland). The Condamine flows first in a northerly direction for a considerable distance, then turning west and afterwards south, it flows toward the Darling, becoming known in its lower course as the *Culgoa*, which joins the Barwon (the larger, but shorter branch), about 20 miles above Bourke. The name Barwon is given to the main stream between the Bogan junction and Boronga, above which it is known as the *Macintyre*; under this name it rises near Ben Lomond. About half-way between the villages of Bengalla and Boggabilla the Macintyre is joined by the *Dumaresq*, a fine stream

which rises near the Queensland border not far from some of the headwaters of the Clarence. A remarkable circumstance in connection with the Darling is that from the Culgoa junction to where it joins the Murray at Wentworth, this great watercourse has not a single permanent tributary—the *Paroo* terminating in swamps about 40 miles north-west of Wilcannia, and, like the *Warrego*, only reaching the main river during great floods. Thus “for over 1,000 miles this great river holds its solitary course, Nile-like, feeding the thirsty plains of the south with water falling many hundred miles distant on the downs of Queensland.”

As to the *Paroo*, a writer who knows it well says that “it occasionally has water in it,” but that for the most part “a clump of trees on a plain is all the bed the *Paroo* River has. Yet once in 20 years or thereabouts, a flood comes even to the *Paroo*, and there was a never-to-be-forgotten occasion—it was in 1870, the year of the Franco-Prussian war—when a steamer managed to get into the *Paroo* from the Darling, and even followed it up to a point across the Queensland border.”

The banks of the river are for the most part higher than the surrounding plains; indeed, the river bed itself, though from 30 to 40 feet beneath the bank, is in some places but little below the general level of the adjacent country, and during floods the river banks are often the only dry land visible for miles. During periods of long continued dry weather, this fine stream suffers not only in length but also in volume, and dwindles above Menindie to a succession of reaches with little or no flow between them, and in some places exists only as a mere chain of waterholes. The Darling is navigable during freshets as far as Walgett, 1,910 miles from the sea, while the total length from its source to the sea is 2,310 miles.

In order to make the Darling more serviceable as a commercial highway, the construction of a series of locks has been proposed. Proposals also have been made for diverting the Darling waters at several places into irrigation areas. One of these is the conversion of Lake



THE DARLING RIVER AT BOURKE.

Menindie into a large permanent water storage basin, by means of a diversion weir across the Darling—the ultimate object being the irrigation of a large area of land south and west of the lake. The only works as yet carried out on the Darling are a lock and exit at Bourke Hill, with a view of ascertaining the most suitable type of weir to be used in connection with the scheme for locking the whole river. Most of the plain country within its middle and lower basin is occupied by squatters as sheep runs, and much of their produce is sent down it to Victoria and South Australia. Most of its upper basin, both in Queensland and New South Wales comprises large farming areas—dairying, fruit-growing, and wheat-growing being the chief employment of the occupiers. The chief tributaries of the Darling within New South Wales are the *Gwydir*, *Namoi*, *Castlereagh*, *Macquarie* and *Bogan*, all of which, on account of their size and importance, will be separately treated. The Darling was discovered and explored for a short distance in 1829 by Captain Sturt, who gave it the name it has ever since borne, in honour of Sir Ralph Darling, at that time Governor of New South Wales. Its confluence with the Murray was indisputably established by Sir Thomas Mitchell in 1835.* Among the chief settlements on the Darling are Brewarrina, Bourke (the present terminus of the Great Western Railway), Wilcannia, Menindie and Wentworth.

The GWYDIR (350 miles) rises in the New England Range, near the Rocky River Goldfields, and flows north-west to the *Barwon*, receiving throughout its course numerous small tributary streams from the Nandewar and New England Ranges. The chief of these are the *George's*, *Warialda* (or *Reedy*), and *Mosquito* on the right, and the *Horton* and *Wee-Waa* on the left bank. In the lower part of its course the Gwydir sends off several ana-branches, which, after feeding some extensive swamps (called the

*That a large river (supposed then to be the Darling) joined the Murray in the far west, had been observed by Sturt and Macleay in 1829.

“Water-course Country”), unite again with the main stream before the Barwon is reached. The Gwydir originally forked into the channels known respectively as Gwydir and Meei Creeks. Within the last 50 years, however, an accumulation of timber has taken place in the channel of the Gwydir at what is called “The Raft.” This accumulation of timber has collected silt, and formed a solid bar across the river extending between three or four miles. The whole flow of the Gwydir therefore has been diverted and spread over the “Water-course Country” covering an area of over a thousand acres.

The greater portion of its basin consists of good agricultural and pastoral country, while the tracts skirting most of its tributaries (*e.g.*, the *Bingara*) are well-wooded and clothed with gum forests.

Bingara, noted for its hard smoky diamonds, is the chief town on the Gwydir, and Moree, the centre of a great sheep-farming area, stands on a small arm within 2 miles of the main stream.

The lower basin of the Gwydir is riddled with artesian bores which have been sunk both by the Government and by private landowners. Fully a score of these bores yield upwards of a million gallons per day each, while very many others, although of less capacity, are of immense importance to the sheep-farming industry in this part of the State.

The NAMOI rises under the name of the *Macdonald*, near the south-eastern extremity of the Moonbi Range. For some distance the *Macdonald* flows northward, becoming known at length as the *Muluerindi*. After rounding the northern extremity of the Moonbi Range the *Muluerindi* is joined by the *Warrabah Creek*, about 15 miles north-east of the township of Manilla, and then becomes known as the *Namoi*, which, after a course of 430 miles in a northerly and north-westerly direction, joins the *Barwon* near Walgett. It receives in its middle and upper course numerous tributaries, the chief of which are the *Peel* (issuing from the Moonbi Range), the *Mooki* (or *Conadilly*), the *Terabeille*, and the *Manilla*. For irrigation

purposes, it has been proposed to make a cutting at the head of Pian Creek, a large ana-branch of the Namoi which leaves the main stream a little above Wee Waa, and joins it again near Walgett. The Upper Namoi basin is very rugged, and in parts gold-bearing, but it opens out below Gunnedah into rich undulating pastoral and wheat-growing country for about 80 miles. Then the land changes on the south bank to sandy plains, interspersed with clumps of pine and mallee, while the north bank is flanked by good sheep-raising land as far as the Barwon. The Liverpool Plains, discovered by Allan Cunningham in 1825, and long noted for their fertility, lie within the basin of the Namoi. The chief towns on this river are Manilla, Gunnedah, Narrabri, Wee Waa and Walgett, while Tamworth is on its chief tributary, the Peel. An extensive tract of timbered country in the Namoi basin, now recognised as well suited for agriculture, is the *Pilliga Scrub*. It lies roughly between Narrabri and Coonabarabran, and, having rich soil and an annual rainfall of 26 inches, is destined soon to become a productive wheat and fruit growing district, as well as a thriving sheep-farming area. It is watered by the Baradine, Dubbo, and Bohena Creeks, all of which drain into the Namoi. Baradine and Comebychance are settlements on the Baradine, while Pilliga is on Dubbo Creek.

The CASTLEREAGH rises in the southern slopes of the Warrumbungle Range, within a few miles of Coonabarabran, and after a winding course of about 340 miles, joins the *Macquarie* about nine miles from the junction of the latter with the *Barwon*. It was discovered in 1818 by Oxley, and its dry bed was followed for some distance by Captain Sturt during the terrible drought of 1828. It receives numerous small tributaries, among which may be mentioned the *Gulargambone* and *Coonamble Creeks*. The prevalence of floods and droughts alternately renders the profitable occupation of a good deal of the Castlereagh basin difficult. The full volume of the river is only seen during floods: in dry seasons it dwindles into a succession of waterholes, separated from one another by long reaches of drift sand.

Below Mundooran, and onwards almost as far as Coonamble, it flows between black soil banks in a bed about 200 feet wide, while in several places below Coonamble it is merely a narrow gutter that one could easily jump across, and indeed for many years in succession its waters never reach the Barwon at all. In the upper part of its course the river flows through deep, precipitous gorges of basalt with occasional large swamps and grassy tracts devoted to sheep-farming and wheat-growing. Coonabarabran, Coonamble and Gilgandra are important centres of settlement on the Castlereagh.

The MACQUARIE (590 miles) is formed by the union of the *Fish* and *Campbell's Rivers*, both of which rise in the Main Range near *Shooter's Hill* (eight miles south-west of the Jenolan Caves), and unite near White Rock, a few miles from Bathurst. The land on both sides of these rivers is rugged, though clothed in parts with fine grass, on which large numbers of sheep and dairy cattle are pastured. Beyond Bathurst, the Macquarie is joined on its right bank by the *Turon*, *Pyramul*, *Cudgegong*, *Talbragar*, *Coolbaggie* and *Castlereagh Rivers*, and on the left bank by the *Lewis Ponds* and *Bell Rivers*, and numerous smaller streams. Onwards from Narromine (the centre of a fine wheat-growing area), the Macquarie flows north-west through wide level sheep-grazing plains intersected with belts of gum and yellow-box forests, till it loses itself in a big reed-studded swamp known as the *Macquarie Marshes*. The latter in turn drains into the Barwon in flood time by several channels, the largest of which—called the Macquarie or *Wamerrawa*—is joined in its lower course by the Castlereagh. Before reaching Dubbo the action of the Macquarie as a geological agent is erosive, while below that town it is constructive, depositing in flood time successive layers of sediment and affording a practical demonstration of the manner in which the great basin, now occupied by the Great Plains, has in the course of ages been filled up. Ages ago the river flowed along a hard palæozoic floor, on which it has deposited layer after layer of sediment, and all these

old gravel beds must be filled by water soaking through from above before the Macquarie can be flooded.

Weirs have been constructed at several places on the Macquarie in order to secure a permanent supply of water for stock and for ordinary town needs. Among these may be mentioned (i.) The Gin Gin Weir, 25 miles up-stream from Warren, which diverts the water from Ewenmar Creek for a distance of 20 miles; and (ii.) the Warren Weir, three miles from Warren, which holds back a supply of water for about 15 miles. By reason of this weir, water is diverted to Cookamurra Creek and Crooked Creek, and from the last-named by a cutting, to Duck Creek. It has been proposed to construct a storage reservoir on the Upper Macquarie at Wotton, a short distance below Bathurst; and another at Burrendong, below the Cudgegong junction, for the purpose of supplying water by gravitation for a large irrigation area west of Narromine.

To the early explorers this river was a puzzle. It was found by Oxley, who explored it for some distance during a favourable season, to terminate in a vast reedy swamp, which he pronounced to be the commencement of a great inland sea. Ten years later, in 1828—during a protracted drought—it was visited by Captain Sturt, who found, instead of swamps, a forest of tall reeds, and further on a chain of ponds, while all traces of an inland sea had disappeared. The earlier tributaries of the Macquarie drain the once-flourishing goldfields of Hill End, Tambaroora, Hargraves and Gulgong; while Bathurst, Wellington, Dubbo and Warren are important centres of trade and population on its banks.

The BOGAN (the *New Year's Creek* of Captain Sturt), rises at Goonumbla Hill, a detached mountain near a low range a little north of Parkes, and after a course of 370 miles joins the Darling between Bourke and Brewarrina, not far from the Culgoa junction. The catchment area of the Bogan is very small compared with the length of the stream, and in dry or moderate seasons the river very seldom runs through to the Darling. During the last 100

miles of its course the Bogan does not receive a single tributary, but in its upper course it is fed by the *Duck*, *Gunningbar*, and a few smaller creeks. It is crossed by the Great Western Railway at Nyngan. It was on the Bogan that Mr. Cunningham, the botanist of Sir Thomas Mitchell's exploring expedition of 1835, was murdered by the blacks. In periods of drought, the Bogan, like almost all the rivers of the interior, becomes merely a chain of ponds. Its lower basin is occupied by sheep stations, while wheat-growing, and, to a limited extent, copper and silver mining engage the attention of the settlers occupying the upper basin of the stream. Clumps of pine and box line for miles portion of the middle and lower Bogan.

The LACHLAN (850 miles) is the chief tributary of the Murrumbidgee. It is formed by the united waters of the *Lerida* and *Cullarin Creeks*, which rise in the western slopes of the Cullarin Range, about eight miles east of Gunning. It flows first north, receiving on its right bank the *Crookwell*, *Abercrombie*, and *Belubula Rivers*, and on its left the *Jerrawa Creek* and the *Boorowa River*, besides numerous smaller streamlets. On reaching the plains it turns west and south-west, and passing Cowra, Forbes, Condobolin, Hillston and Booligal, joins the Murrumbidgee. About 20 miles north of Hillston, a portion of its flood-waters forms the *Willandra Billabong*, which, after a westerly course of 250 miles, drains into the Murray, but only in very high floods. For several miles on either side of Forbes the banks of the river are frequently higher than the surrounding country, which sinks into hollows forming large and deep swamps after heavy rain storms. Near the junction of the Lachlan and Murrumbidgee the country is covered with a network of swamps, which Oxley met with, and was impeded by, on his first exploring expedition in 1817. For about 50 miles above Forbes the river has a fall of a little over a foot per mile. Below Forbes the country is flat, its run-off contributing practically nothing to the volume of the river, except in times of very heavy rainfalls. Lower down the river becomes

Dac

deltaic, till finally, below the town of Oxley, it has no clearly defined channel, and loses itself in reed beds. It is only in time of high flood that the waters of the Lachlan actually reach the Murrumbidgee. The basin of the Lachlan comprises, in its upper and middle portions, fine wheat and fruit growing country, with rich auriferous tracts at intervals, while the lower course of the river is flanked by sheep runs. Below the Willandra Billabong not a single tributary creek is met with, and nothing is to be seen but a long stretch of almost level plains, interrupted here and there by belts of mallee, stunted gum, and salt-bush.

The MURRUMBIDGEE is a fine river, 1,050 miles in length, rising in a northerly spur from the Kosciusko Plateau. In regularity of flow and volume of discharge it ranks next in importance to the Murray. The longer of its two head streams has its origin at the base of Peppercorn Hill, a rugged peak ten miles north-east of the township of Yarrangobilly; while the other rises on the northern slope of Mount Tantangora, about three miles from Kiandra. After the junction of these two heads the Murrumbidgee flows south to within five miles of Cooma, where it bends north, receiving the *Umaralla*, *Molonglo*, *Queanbeyan* and *Yass Rivers* on the right bank, and *Naas Creek*, the *Cotter*, *Goodradigbee* and *Tumut* on the left. Below the Yass junction the course of the river is westerly past the towns of Jugiong, Gundagai, Wagga, Narrandera, Hay and Balranald, until it finally joins the Murray. In its upper course the Murrumbidgee passes through extremely rugged country, and drains the Kiandra, Gulf and Adeiong gold-fields. Near the junctions of most of the tributaries there occur extensive level tracts of great fertility. After the confluence of the Tumut, the surrounding region opens out into extensive plains and greatly undulating country devoted to wheat-growing and sheep-farming. From Wagga to the Lachlan junction the river passes through the fertile Riverina district, and in this part of its course much of its water escapes during flood time into numerous billabongs

or shallow watercourses, which drain a wide area. Its lower basin consists of good pastoral and agricultural land. At intervals along its lower course belts of stunted gum, mallee scrub, and saltbush are met with; and often in very dry seasons the stream is reduced to a mere chain of water-holes, even as far down as Hay. Captain Cadell opened up the navigation of the Murrumbidgee in his steamboat "Albury," as far as Gundagai, in 1858. Small river steamers trade up the river to Wagga for a few months of the year, and to Hay for nine months, while during freshets small craft ascend to Gundagai. The fact that the Murrumbidgee joined the Murray was established by Captain Sturt during his well-known voyage from Hay to Lake Alexandrina in a whaleboat in 1829.

It is deserving of notice that the Murrumbidgee flows through the Federal Territory, the future Federal capital being situated on one of its tributaries, the Molonglo, and deriving its water supply from another, the Cotter.

It has been estimated that two-sevenths of the waste flow of the Murrumbidgee would irrigate $2\frac{1}{4}$ million acres of wheat, oats, or barley to a depth of $4\frac{1}{2}$ inches; and this would give a return of 40 bushels of wheat or 60 bushels of oats to the acre, with a gross return of well over £8,000,000 in either instance. This shows the importance of irrigation works in the future development of agriculture along the river, for, under present conditions, in very dry seasons the crops from Narrandera to Balranald are almost total failures—despite dry-farming and drought-resisting grain.

LAKES.

New South Wales is singularly deficient in large lakes. Even those the State can boast of are in very many cases by no means permanent. For example, a large ship could sail at times on either Lake George or Lake Menindie, while after long droughts, cattle and sheep have been seen grazing on the dry beds. Passing over the so-called "lakes" of the Coast District—which have been dealt with already

under the heading of "Lagoons"—the New South Wales lakes belong to three systems: (i.) Those of the Tablelands; (ii.) those of the Western Plains, and (iii.) the glacier lakes or tarns of the Kosciusko Plateau. The first are due to volcanic and other active geological agencies in the far distant past; the second to the overflow of the western rivers during flood time into natural depressions on the plains, and the third to the banking up of water by moraine material left behind by the glaciers of a bygone age.

A. LAKES OF THE TABLELANDS.

With the exception of the *Guyra Lagoon* (a crater lake in the New England District), almost all of these belong to the Southern Tableland, and are situated within a few miles of Goulburn, Queanbeyan, and Braidwood. The largest is LAKE GEORGE (called by the blacks *Werriwa*). It occupies the southern portion of a depression in the Cullarin Range, called the Lake George Basin, the solitary example in the State of a purely inland drainage area. This basin is due to alterations in the level of adjacent land areas, due to earthquake and volcanic disturbances in past geological times. Lake George stands at a height of 2,200 feet above the sea, and its southern end is within three miles of Bungendore. It is 16 miles long and six miles across in its widest part, and when full, it covers an area of about 60 square miles. The southern portion of the Cullarin Range towers as an unbroken mountain wall 500 feet high along the whole western side of the lake. No stream falls into Lake George on the western side, but on the east it is fed by Murray's Creek, Taylor's Creek, Deep Creek, and Turallo Creek. There is a slight depression in the western flanking wall called Geary's Gap through which—in old coaching and bullock-dray days, before the advent of the railway to those parts--the Great Southern Road passed over the Cullarin Range on the way to Goulburn and Yass.

Lake George is more often dry than otherwise. It loses a great deal of its waters by evaporation, but in addition a large portion runs off through the slate formation in the bed of the lake. In ages long since past, when the features of the country were far different from those of to-day, a river running a few miles south of Geary's Gap drained off its surplus waters. The dry lake increases the sheep-carrying capacity of the adjacent runs. Its bed is divided up into grazing leases, fences run almost across it, and the southern portions have been from time to time cultivated, very good crops of wheat and maize being produced. When the lake is full both sheep and cattle drink its waters, but as these get lower the proportion of salt is too great to permit this. A line between stations on the eastern shore of Lake George is taken as the base line for the main triangulation survey of New South Wales. The lake was discovered in 1817 by Hamilton Hume, who considered it a portion of the inland sea which some of the early explorers erroneously thought occupied the interior of New South Wales.

LAKE BATHURST, also discovered by Hamilton Hume in 1817, lies one mile from the township of Tarago and ten miles east of Lake George. It was called by the blacks *Bundong*. In ordinary seasons it covers an area of about $5\frac{1}{2}$ square miles, but shrinks considerably in continued dry weather, and like Lake George, is often dry altogether. In floods it drains into Mulwarree Creek. It is surrounded by fertile plain country, stands at a height of 2,000 feet above sea-level, and is about 20 miles south of Goulburn.

LAKE BURRA BURRA is a small sheet of water on the western flank of the Main Range, five miles west of Taralga. Its bed is often very dry for years, and when it is dry it is used by the adjacent landowners for grazing and farming areas; when full it covers 290 acres. Its greatest length and its greatest breadth are each about one mile.

B. LAKES OF THE WESTERN PLAINS.

These are met with chiefly along the lower courses of the larger rivers of the west—the Darling, Lachlan, Murrumbidgee, and Murray. As a rule they occupy depressions which become filled during floods with the overflow waters of the rivers. On the Darling alone there are 70 of these lakes, the most important being *Lake Cawndilla* (9 miles south-west of Menindie), which covers 23,000 acres, and has a storage capacity of 17,196,000,000 cubic feet. It is filled by natural channels and by the natural overflow from *Lake Menindie* during high floods. Lake Menindie itself will impound, it is estimated, 16,700,000,000 cubic feet of water. The overflow from Lake Menindie alone, after it has been filled by flood waters, has been observed to maintain navigation in the Lower Darling for many months after it has ceased higher up stream.

As the flood waters, in the case of the smaller lakes especially, evaporate rapidly in continued dry weather, many of them become for the greater part of the year only extensive mud basins covered in parts with saline incrustations. For this reason their area cannot be stated with accuracy; they vary with the rainfall, covering extensive tracts in wet seasons, while in times of drought their waters disappear altogether or become reduced to a string of waterholes. Lake Menindie, for example, in wet seasons is so deep that ships could sail upon it, while during one drought at least, sheep were seen grazing on its dry bed.

These western lakes are destined as time goes on to play an important part in irrigating large tracts of land, and thereby making it suitable for agriculture. The holder of a large station on the Darling, referring to one of these lakes, stated at a public inquiry a few years ago that he had obtained authority "to make a cutting from the Darling for 10 or 12 miles in order to take floodwater from that river at a lower level. By means of this cutting, and by erecting dams, the floodwaters were backed up into lakes covering approximately 180 square miles. These



Photo, by Rev. J. Milne Curran.

LAKE ALBINA—WITH MOUNT KOSCIUSKO IN THE BACKGROUND.

(Shewing Region above the Tree Zone.)

lakes were filled to the brim in the 1890 flood, and even then an immense amount of water got away. *The stored water remained in the best holding grounds for about five years."*

Along the Darling between Bourke and Wentworth, the largest of these lakes are: *Poopelloe* and *Gunyulka* on the left bank, and *Menindie*, *Cawndilla* and *Tandon* on the right.

Within the Lachlan basin *Lakes Cowal* and *Cudgellico* are the most important.

Lake Cowal receives from the south the drainage of an extensive plain called *The Bland*. By means of a cutting leading from the Lachlan to Lake Cudgellico a considerable quantity of floodwaters is conserved and drawn off for irrigation purposes when the river is low. Fish and game abound, and it is an ideal sheet of water for skiff racing and shallow centre-board sailing. It is intended to raise the embankments of Lake Cudgellico three feet, and so double its present capacity.

On the right bank of the Murray, and within about 50 miles of the South Australian border, is Lake Victoria. It covers an area of about 26,000 acres, and is connected with the main stream by the Rufus River, through which it is fed when the Murray is high. The outflow from the lake has been known to keep the river navigable to South Australia for four weeks after it had been closed above the Rufus. The erection of works on Lake Victoria will doubtless play an important part in the future navigation and development of the lower Murray.

C. THE KOSCIUSKO LAKES.

These lakes are all due to the blocking up of small valleys by barriers of moraine materials left behind by the glaciers that once decked the higher slopes of Australia's highest mountain mass. They are situated at an elevation

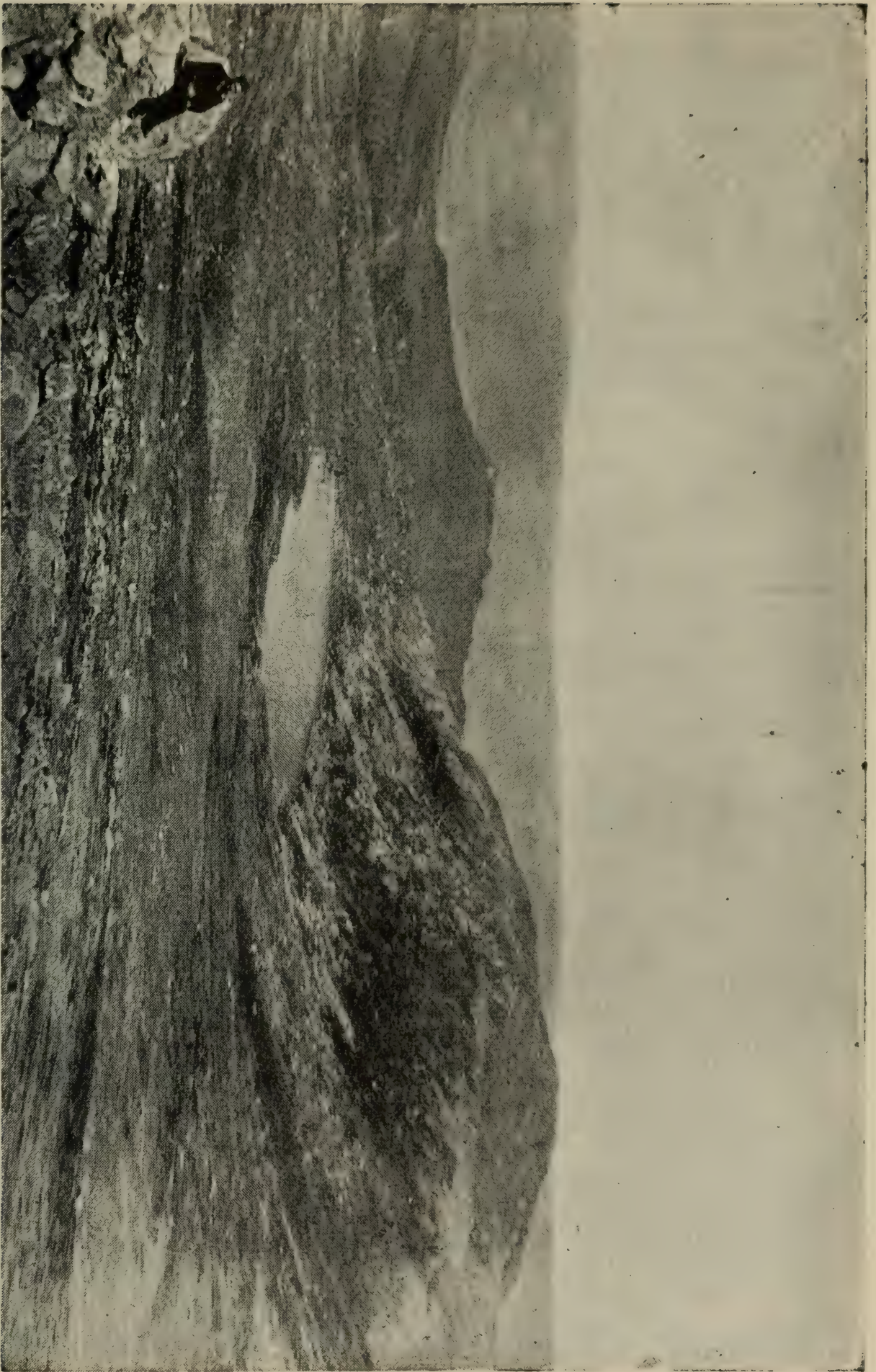


Photo. by Mr. Joseph Brooks.

LAKE COOTAPATAMBA, OR LAKE MAY—MOUNT KOSCIUSKO.
(The highest lake in Australia.)

of about 6,000 feet above sea-level, and include THE BLUE LAKE, LAKE ALBINA, LAKE COOTAPATAMBA, the CLUB LAKE and HEDLEY TARN. The fish and other animal life of these lakes are similar to those of the lakes of Tasmania. The BLUE LAKE (also called Lake Merewether) is greatly admired by tourists on account of the beauty of its waters. This lake is about a quarter of a mile wide; it covers an area of 60 acres, and is from 70 to 75 feet in depth.

Lake Albina is a mile and a half north of the summit of Mount Kosciusko, is 50 chains long by 10 broad, and covers an area of 36 acres.

Hedley Tarn (6,070 feet above sea-level), is a beautiful lakelet 10 acres in area, about four miles north-east of Mount Kosciusko. It is bounded on the south by a peculiar terminal moraine of great interest to geologists.

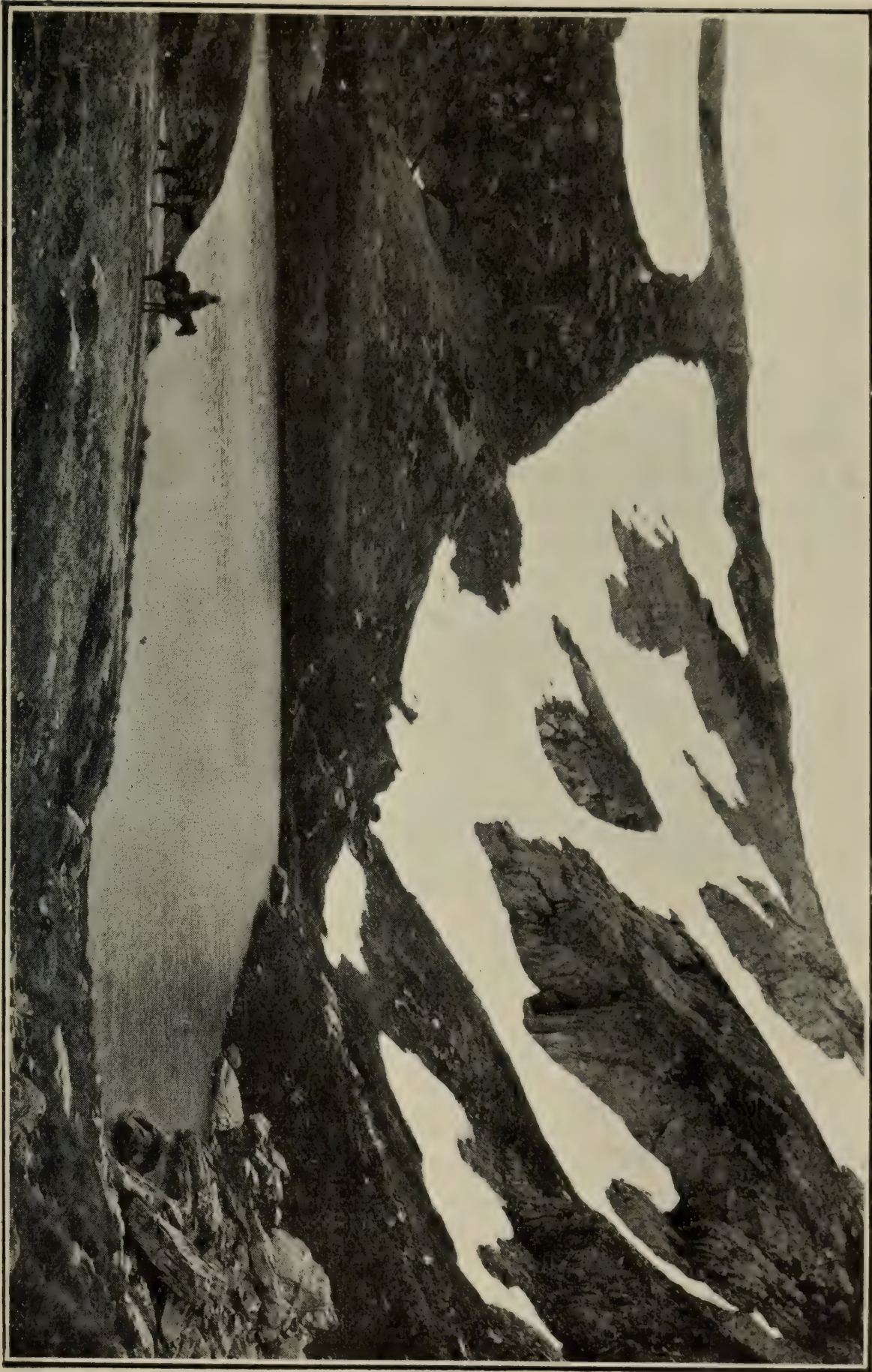
Lake Cootapatamba (also called *Lake May*, being so named in 1846 by T. S. Townsend, Deputy Surveyor-General of New South Wales) is a quarter of a mile long and about 17 feet in depth.

Winter visitors to the Kosciusko region delight to skate on these lakes, all of which are covered at that season with a thick coating of ice.

CLIMATE.

(a) TEMPERATURE.

New South Wales lies altogether within the south temperate zone, and its mean annual temperature is 59.5 degrees, or only one degree hotter than that of Paris. The mean summer temperature only reaches 68 degrees, and that of winter 44 degrees, a range almost identical with that of the famous health resorts of the south of France. Speaking broadly, the climate of this State may be described as similar to that of Southern Europe. It varies, of course, according to latitude and elevation; but, on the whole, it is warm and dry. In the northern portion



CLUB LAKE—MOUNT KOSCIUSKO.

of the coast district the climate is hot, and, at times, disagreeably muggy in summer, but, on the other hand, it is pleasantly warm in winter. Notwithstanding this occasionally oppressive mugginess, the district is free from the epidemics and pestilences which are usually met with in hot countries. On the tablelands it is delightfully cool and dry in summer, while in winter it is cold. On the Kosciusko Plateau snow lies on the hill-slopes from March to December. On the interior plains the winter climate is dry, refreshing, and enjoyable; it is hotter in summer and colder in winter in this region than in places of corresponding latitude on the coast, and, despite the great heat experienced on the plains in the middle of summer, when the thermometer very frequently registers over 100 degrees in the shade, the climate is not by any means oppressive, as the air is not laden with that moisture which, on the sea coast, would render such a degree of heat almost unbearable. As far as mean annual temperature is concerned, towns in New South Wales may be placed alongside European towns as follows:—Kiandra and Edinburgh; Cooma and Plymouth; Bombala and London; Tenterfield and Madrid; Dubbo and Rome; Sydney and Toulon; Bathurst and Bordeaux.

(b) RAINFALL.

The average annual rainfall of the coast varies from about 70 inches at the Tweed Heads in the far north, to 35 inches at Eden near the Victorian border. The region, with Sydney as centre, and extending north to Newcastle and south to Kiama, shows an annual average of 50 inches. On the Tablelands, the average varies from 30 inches in the north to about 25 in the south. The 20 inch rainfall limit is a line extending roughly from Mungindi (on the Queensland border) southward through Pillaga, Trangie, Parkes, Forbes, Barmedman, Temora, and Coolamon (in the centre of the wheat belt), to a point on the extreme south between Corowa and Deniliquin. The 15 inch line runs approximately from Barrington on the north, through

Bourke, Cobar, and Mount Hope, to a point west of Moama on the Murray.

West of the 15 inch line, the average annual rainfall tails off, till in the far west, it is reduced from 10 inches about Wileannia, to between 8 or 9 inches at Broken Hill.

It is quite a mistake to look upon New South Wales as an essentially dry region. In point of fact, the rainfall is not unduly irregular. As in most other countries in the temperate zone, there are from time to time periods of rather protracted dry weather, but with the exercise of ordinary reasonable forethought, and the expenditure of a little extra time and labour, farmers and squatters can, by storing both fodder and water during the years of abundance, provide against the possibility of ruinous losses in times of drought. Our position in this regard has been well stated by Mr. H. A. Hunt, Australia's leading meteorologist, who thus writes: "Let us not delude ourselves with the idea that our rain and climate are peculiarly uncertain. Let it be understood that they are not more so than those of other countries. In fact, if anything, they are too generous. Let us be more provident and less speculative. Food and water may be husbanded occasionally unnecessarily, but our history tells us that such provision is absolutely necessary. The superabundance of grass, herbage, and water in good seasons, if conserved, will carry us over a succession of bad ones sooner or later, and although at times it may appear as waste of labour and money in so doing, consider the reserve of wealth we shall have stored away; and also remember that, should we not want its fodder ourselves, the vagaries of seasons in other parts of the world may make a lucrative opening for export. In climates such as those of Europe, parts of Asia, and North America, the harvesting of crops for fodder has to be undertaken every year, so that the stock may be kept alive during the winter months, when the ground is covered with snow, a season when the soil is resting and regaining its spent fertility."

The huge storage reservoir at Burrinjuck, on the upper Murrumbidgee, which is being pressed on with speed by the Government towards completion, will, in the near future, solve the difficulty of the shortage of rainfall over an immense dry area of great natural productiveness in the interior of the State. It is generally hoped that the Burrinjuck will but be the precursor of many other statesmanlike enterprises of a like nature for the successful development of the rich but dry agricultural tracts in the New South Wales hinterland.

(c) WINDS.

Owing to the great heat of the regions about the Equator, a perpetual upward-flowing air current exists in the torrid zone. In the higher parts of the atmosphere, this huge rising air current breaks up into two portions, one flowing towards the north pole and the other towards the south. As they continue to move pole-wards in the higher parts of the atmosphere, they soon become cooled (and therefore relatively heavier), and so descend towards the earth's surface. This occurs generally about the parallel of 30 degrees. These descending air currents produce, then, in each hemisphere, a region of high pressure (or *anticyclone*) throughout the year about this latitude.

Let us confine our attention to what takes place in the southern hemisphere.

In the first place, the earth, as is well known, is continually revolving on its axis from west to east. As these downward moving air currents reach the earth's surface, about the latitude of 30 degrees S. (further south in summer, and not so far south in winter), they produce there a region of high pressure. These currents, it must be borne in mind, come from a part of the earth where the rotation is great (roughly about 1,000 miles per hour, or about 18 miles per minute), to regions where it is much less, and consequently these high pressure belts (anticyclones) acquire a movement towards the east instead

of from north to south, as would be the case if the earth did not turn on its axis. Thus throughout the year we find passing over Australia from west to east a succession of anticyclones, and it has been found that these are the main factor in determining the winds and general weather conditions of the continent. Careful observations have shown that, about the parallel already indicated, a series of anticyclones surround the globe, the latitude of the average one varying with the season, being further to the south in summer than in winter.

As a rule, an anticyclone moves from west to east across Australia at the rate of between 400 and 500 miles per day, and thus takes a week or thereabouts to cross the continent. Speaking generally, it has been found that about 45 of these huge air masses pass over the continent in the course of a year.

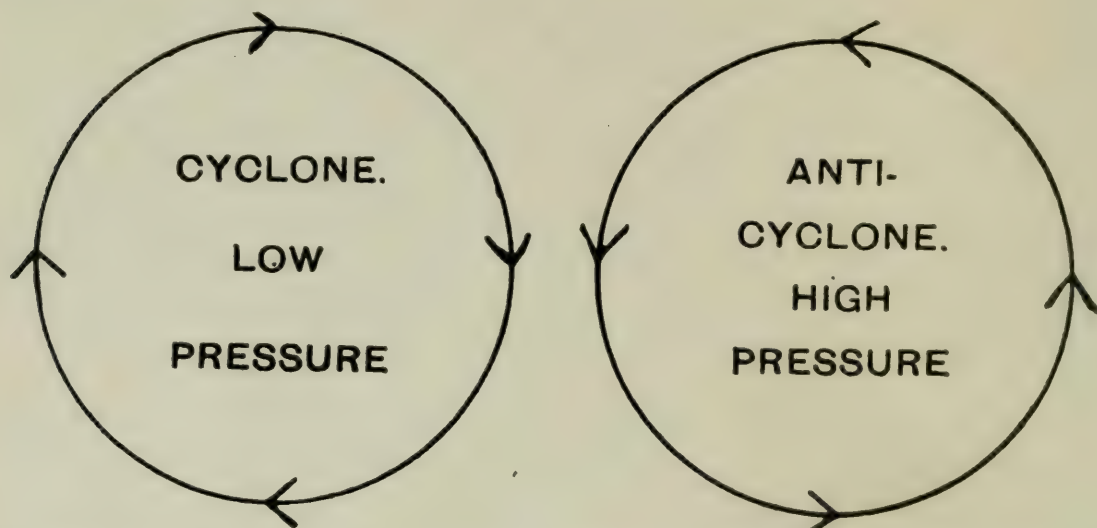
If the anticyclone moves rapidly and in a straight line across Australia, the weather is found to be fine, but when it moves slowly, and appears to drag, or again when it moves in a zig-zag fashion, the weather is usually unsettled.

A belt of low pressure (*i.e.*, *cyclone*), lying to the south of the anticyclone belt encircles the earth from west to east, running parallel roughly to the anticyclone area, and extending almost as far as the Antarctic circle.

In a low pressure area (*cyclone*) in the southern hemisphere, the direction of the wind circulation is that of the hands of a clock which move from left to right, while in the anticyclone (*i.e.*, high pressure area) in the southern hemisphere, the circulation of the wind is anti-clockwise—*i.e.*, from right to left.

Bearing this in mind, let us consider the case of an anticyclone passing over the continent from, say, Perth to Sydney. In the first portion of the anticyclone, the wind movement is from south to north, so that when it reaches Sydney, it brings with it southerly winds, for the comfort

or discomfort of the people of that city according to the season.

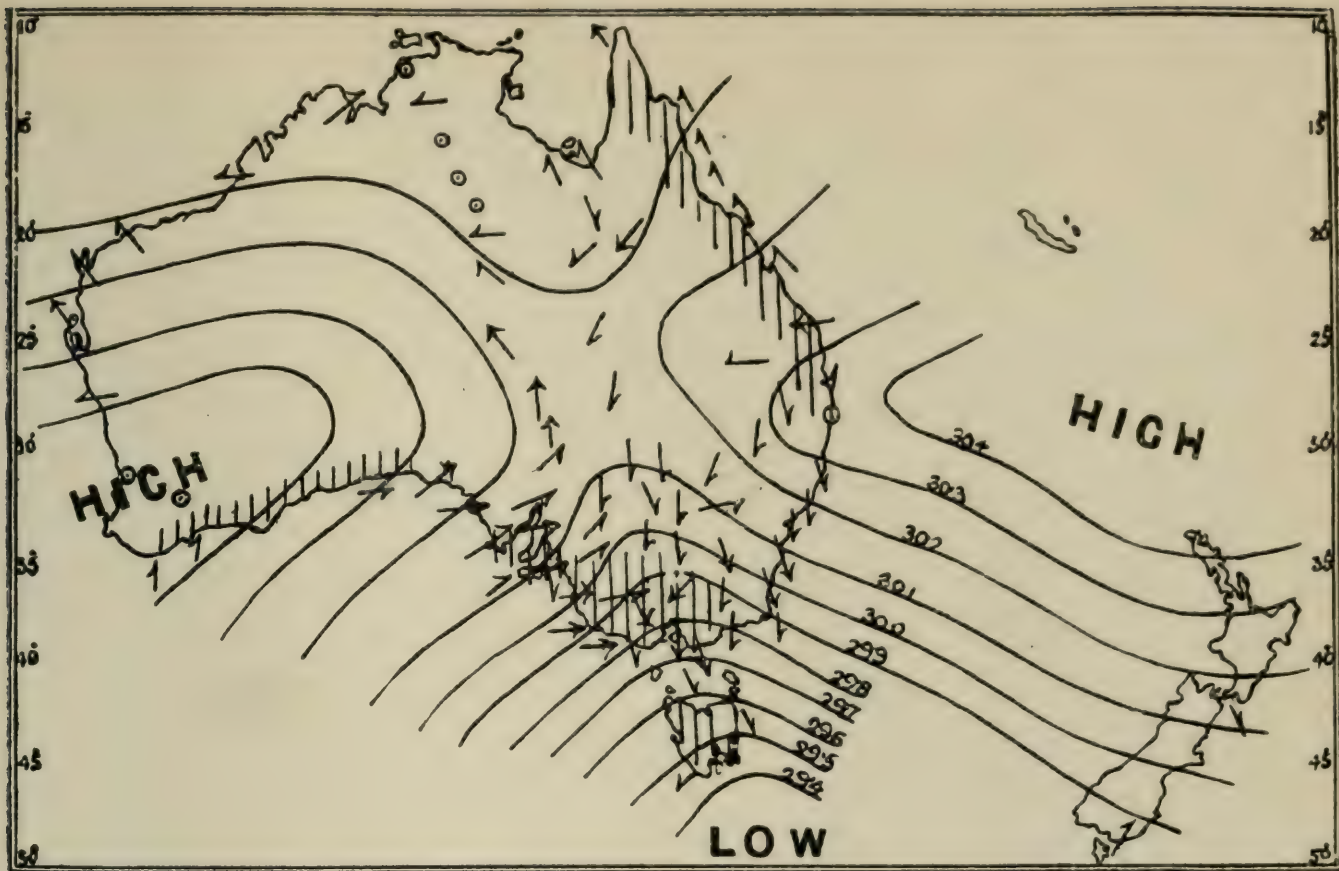


DIRECTION OF WIND CIRCULATION IN SOUTHERN HEMISPHERE.

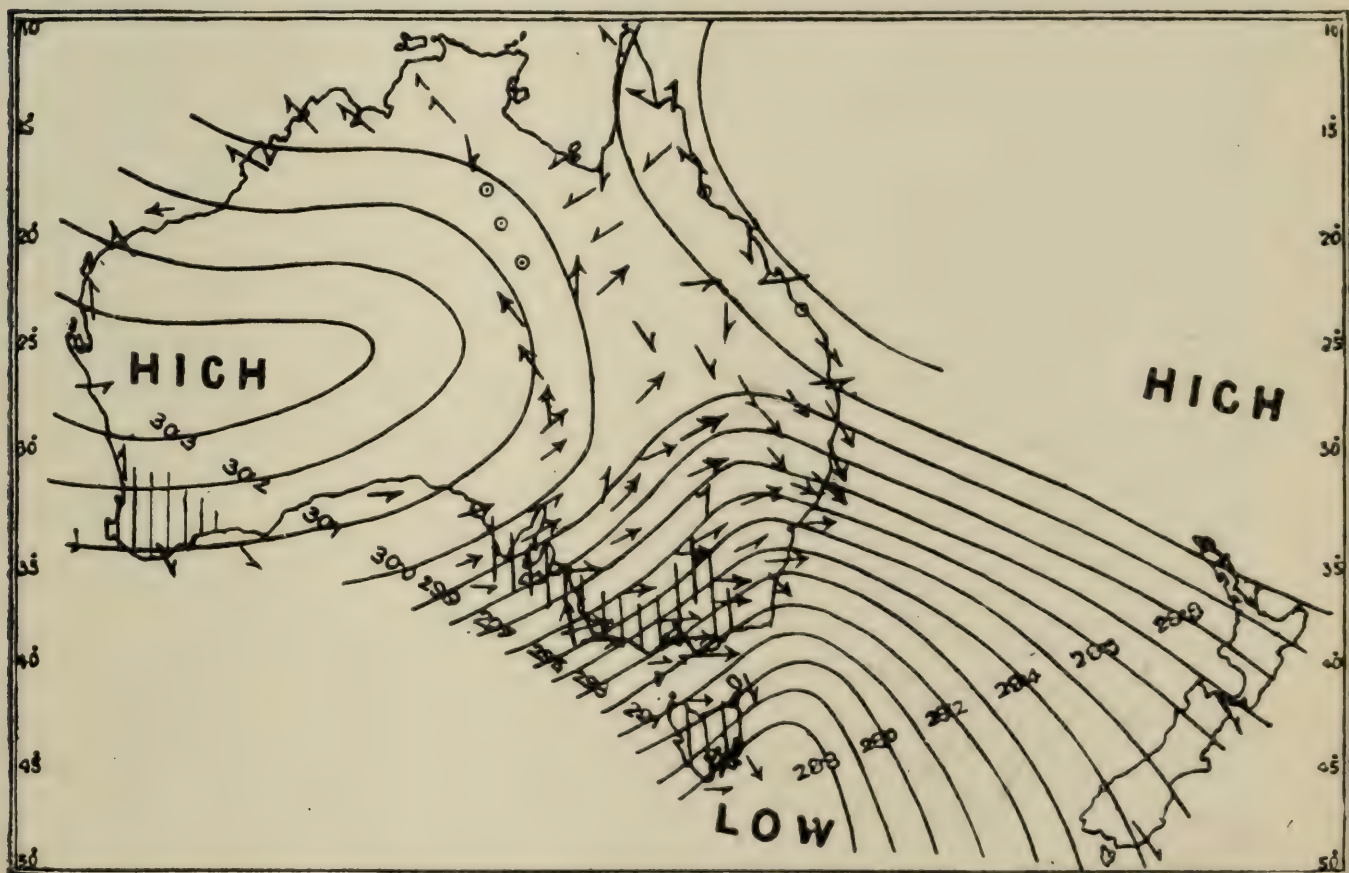
As the front portion of the same anticyclone moves further eastward, Sydney will, as a rule, experience fine and settled weather, with the exception that in the depth of winter, when the main axis of the anticyclone does not reach so far southward, the circulation in its southern portion will be from west to east, so that westerly winds will be experienced in the New South Wales capital.

When a normal anticyclone is just quitting Sydney on its march further east across the Pacific, the wind circulation in its hindmost portions being necessarily from north to south, northerly winds will be experienced.

Cyclones in the southern hemisphere are huge whirling air masses, which from time to time extend (i) south from the low pressure areas near the equator, or (ii.) north from the low pressure areas near the antarctic circle. The cyclones, like the anticyclones, move from west to east across Australia, and for the most part are confined to the northern and southern portions of the continent; but they often work their way into the temperate regions between two anticyclones, with which they advance eastward towards the Pacific. The air in a cyclone tends to rise, the comparatively heavy air from the surrounding areas of high pressure rushing in to supply the place of



Moving Anticyclones.



Westerly Gale.

TYPES OF AUSTRALIAN WEATHER.

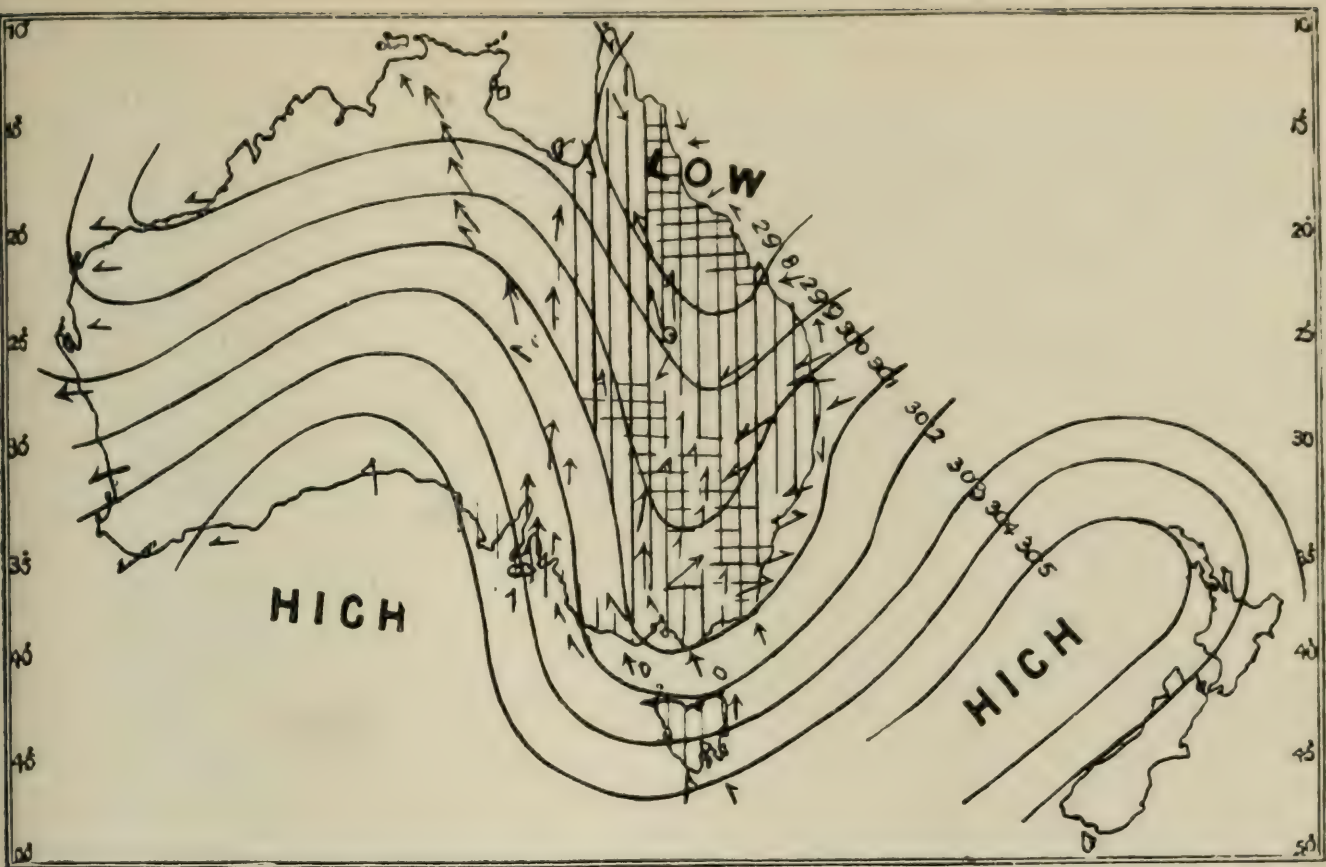
the air rushing upward from the centre of the low pressure area.

The most noteworthy type of cyclone that affects Australia is the monsoonal depression, for it is the most productive rain-bringing agent known to this continent. Monsoonal depressions or tongues may occur at any time of the year, but, as a rule, they are most frequent in New South Wales during the months of January, February and March. Rain almost certainly follows in their track, coming as they do from the tropical seas lying north of the continent, where they become saturated with the watery vapour, which later on is wrung out as rain as they work south into the temperate parts of the continent, and meet there the cool southerly wind circulation of an advancing anticyclone. Thunderstorms, as a widespread feature over the continent, never occur except in company with a monsoonal depression.

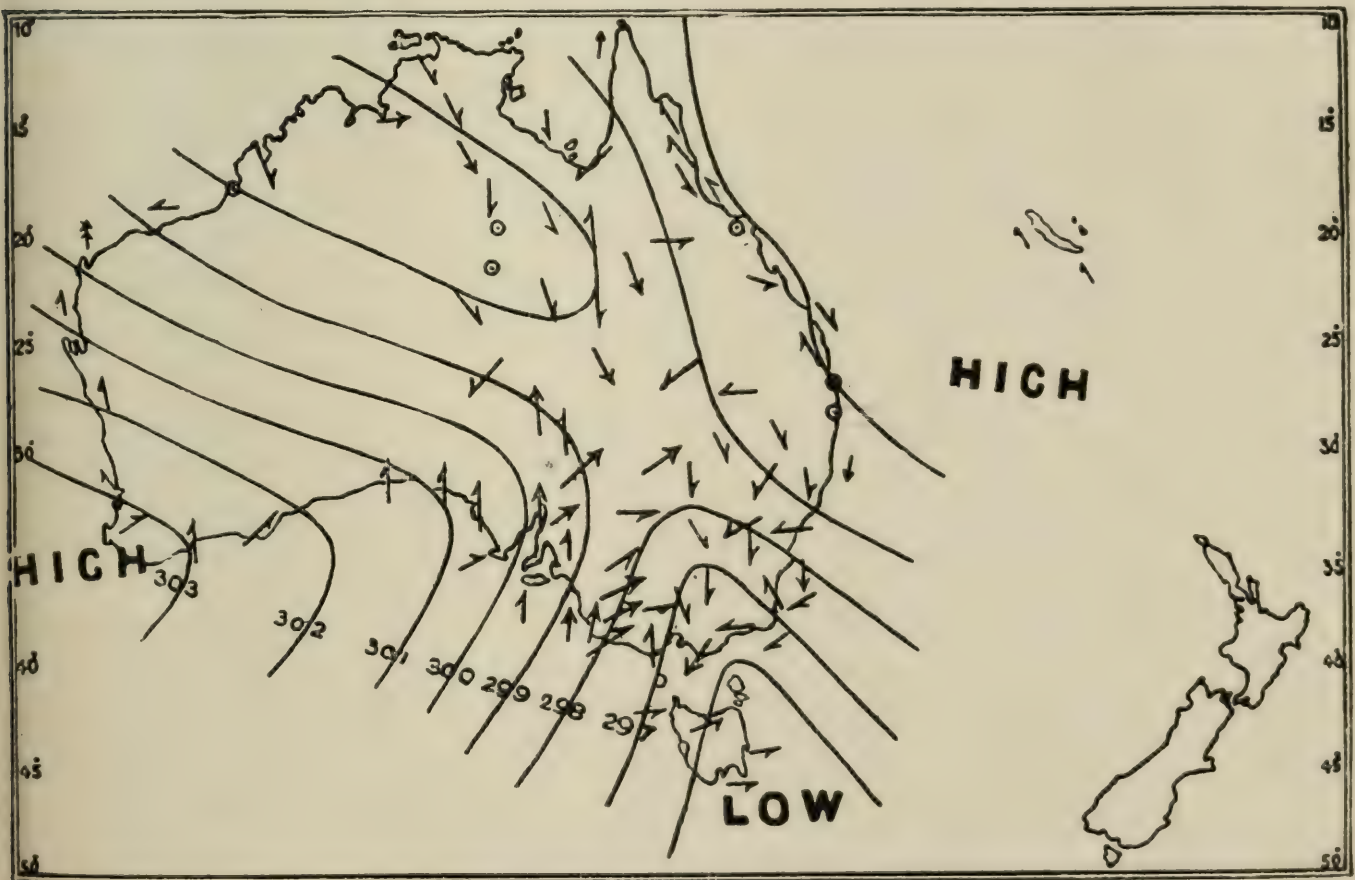
These monsoonal depressions are responsible for the finest rain storms ever experienced in New South Wales, not alone in the coastal area, but over the whole of the interior plains. To these depressions also have been due the heaviest floods that have occurred in our western rivers.

Another type of low pressure tongue works its way down from the north from time to time about midsummer, and passing eastward across the continent in the wake of an anticyclone, produces, under the name of a *heat wave*, all the dry burning conditions which make it an unwelcome visitor. To the heat waves are due, in a large measure, most of the most disastrous bush fires that have from time to time, in the height of summer, produced sad havoc in the crops, grass, and live stock of the interior.

Along the northern half at least of the coast of New South Wales, there is experienced from time to time through the whole of the summer, an important and reasonably constant wind called the *north-easter*. This wind, which is really a monsoon, commences to blow in from the ocean late in the morning, obtains its greatest force between 3 and 4 o'clock in the afternoon, and, as



Monsoonal Rain.



Southerly Buster.

TYPES OF AUSTRALIAN WEATHER.

a rule, gradually dies down about sunset. The north-easter occasionally reaches the dignity of a gale, the velocity not infrequently attaining a rate of 40 miles per hour. The wind, though strong, does not, as a rule, penetrate inland for more than about 20 miles. For about seven months of the year the north-easter is the most constant wind experienced in Sydney. At times it blows as what is called a "black north-easter" for two or three days incessantly.

About two or three hours after the north-easter dies down, there springs up, as a rule, a gentle *land breeze*, which blows during the night from the land towards the sea.

One of the most characteristic winds experienced in summer along the coast of New South Wales, south of the latitude of 30 degrees, is the "southerly buster" (the "Brickfielder" of the early colonists), and so called from the violent rush or "burst" which marks its advent. Notwithstanding the violence of these winds at times, they are welcomed as a most pleasant change and relief after the high temperatures and oppressive northerly winds which always precede them. They are usually first noted at the extreme south of the State, and travel northward at the rate, as a rule, of about 20 miles an hour, although at times, short-lived puffs reach a velocity of 80 miles an hour.

The origin of the buster is briefly and roughly supposed to be as follows:—When a summer anticyclone, with its usual hot northerly winds of its rearward portion, has moved off the coast towards the Pacific, and the succeeding anticyclone is retarded by, it is supposed, the Great Dividing Range, an opportunity is afforded for an uprush from the south towards the north of the V-shape low pressure air mass which develops into the southerly buster.

With regard to this wind, Mr. H. A. Hunt has written: The southerly buster "comes in front of an approaching anticyclone but it is only on the eastern coast, where, aided by the smaller friction of the ocean, and the

shelter which the mountains afford from other winds, the southerly becomes more vigorous, and rushes northward in a squall, which happens so suddenly and with such force, that at times ships drag their anchors in Sydney Harbour."

Another type of wind that is met with at times is the *south-east gale*, which has been responsible for the most disastrous wrecks that have occurred along the New South Wales coast. These gales appear to be due to a very pronounced strengthening of the southerly wind circulation of the front portion of an advancing anti-cyclone, or by the usual rapidly-moving south-to-north circulation characteristic of the rear portion of a spent cyclone which happens to be moving seawards off the coast. Gales of this type are not only disastrous to shipping, but cause great damage at times to property on land, unroofing houses and overturning structures that have not been fixed firmly enough. Fortunately, these gales are of rare occurrence.

With regard to Sydney and Newcastle, the most thickly populated districts of the State, the most constant winds from May to September are westerly, while for the remainder of the year, the prevailing winds is from the north-east.

INDIGENOUS VEGETATION.

The indigenous vegetation of New South Wales is sombre and monotonous; the trees are evergreen, and the changes of the seasons have but little influence upon "the unvaried mantle of olive-green" which clothes the Australian forest. If it cannot be said that the flora of the country is picturesque, it is certainly admitted to be in the highest degree useful. It comprises the *Acacia*, or wattle family, of which upwards of a hundred varieties are known to exist; the *Eucalyptus*, or gum-tree family, which is met with in all parts of the State; the *Casuarina*, or she-oak family; the *Banksia*, or honeysuckle family; and several species of the *Fig* tribe. In addition to these there are the

Cabbage-tree Palm, the *Gigantic Stinging Nettle*, and the beautiful *Tree Ferns*, to whose fine branching fronds much of the wild beauty of the mountain gullies and secluded glens of the coast is mainly due.

The timbers of New South Wales comprise hard wood, soft wood, and pine wood. The chief hard woods are the *iron-bark* (used for bridges and wharf decking, and noted for its great strength and durability); the *blue gum* (thicker in trunk than most gums, being sometimes seven feet in diameter); *spotted gum* (used in shipbuilding); *stringy-bark* (a useful wood, and bark well suited for roofing); *blood-wood* (used for fencing purposes, and for railway sleepers); *tallow-wood* (easily worked, and used for flooring and shipbuilding); and *turpentine* (used for piling and other work in sea-water, as it resists the attacks of the teredo better than any other New South Wales timber). On the alluvial flats of the north coast rivers the *cedar* used to grow abundantly, and in times past was used extensively for the finer kinds of joiners' work, and in the manufacture of furniture; but of late years it has become extremely scarce and is consequently very expensive. Besides cedar, the chief soft woods are *rose-wood*, *white maple*, *myall* and *marblewood*. Some of the soft woods are grained and marked most beautifully, and, being capable of the highest polish, are adapted for the finest cabinet-making work. The consumption of wattle bark for tanning purposes is very great, and rigid legislative steps have been taken to prevent the indiscriminate stripping of the bark, and the consequent destruction of the trees. On parts of the interior plains, chiefly in the Riverina district and the region beyond the Darling, the *saltbush* shrub, noted for its nutritive and drought-resisting properties, furnishes a valuable food for cattle and sheep during periods of drought. The *mallee scrub*, consisting of a species of stunted *Eucalyptus*, grows in clumps mostly near the margins of some of the western rivers. As a rule, the trees in the coastal region (especially along the northern rivers) attain a greater height and

girth, and yield better timber than those of the tablelands or the plains. Trees found along the tablelands are generally of stunted growth, their trunks are crooked and the wood inferior. The trees of the plains (with the exception of the *cypress pine*, the timber of which is used very extensively in buildings, and has the quality of resisting the attacks of the so-called white ants) have little commercial value, their sole use being for fencing and rough building work.

In order to put a stop to the indiscriminate cutting down and destruction of the best native trees, as well as to provide for re-afforesting Crown reserves with the best classes of timber, the Government has established a Forestry Department, whose operations have been attended with salutary results. In connection with this department, Government officers safeguard the State forests throughout the country, take steps as to thinning out and re-afforestation, and in general see to the collection of the State revenue, as far as timber cutters are concerned. In addition, a State Forest Nursery is in operation at Gosford, where the acclimatisation of valuable foreign timber trees and the conservation of such of the best indigenous species as might otherwise be likely to disappear are attended to. This nursery also distributes young trees among settlers in the interior, and supplies them to municipalities, the trustees of public reserves, and other public bodies.

New South Wales possesses no indigenous fruits of any value; but the coastal districts during springtime are covered with native flowers of great variety and beauty, chief among which are the *waratah*, *flannel flower*, *Christmas bush* and *rock lily*. The beauty and fragrance of the yellow *wattle* flower furnish one of the most pleasing features of the scenery of New South Wales in springtime.

THE NATIVE FAUNA.

The LARGER NATIVE ANIMALS comprise the *kangaroo*, *wallaby*, *opossum*, *dingo* or *native dog*, *native cat*, *native*

bear (koala), *echidna*, *flying-fox*, *wombat* and *duck-billed platypus*. Most of these are more destructive than useful. The BIRDS include several species of *parrots*, *parrakeets*, and *cockatoos*, the *brush turkey*, *emu*, *lyre-bird*, *bower-bird*, *native companion*, *black swan*, *pheasant*, *laughing jackass*, *magpie*, *wedge-tailed eagle*, *white-bellied sea-eagle*, and several varieties of *pigeons*, *hawks*, *kites*, *owls*, *ibises*, *bustards*, *spoonbills*, *bitterns*, &c. Of FISHES, some 60 different families, comprising over 300 species, are found in New South Wales waters. Of edible fishes, comprising over 100 different species, the chief are the *schnapper*, *rock-cod*, *bream*, *flathead*, *whiting*, *jewfish*, *mullet*, *mackerel*, *garfish*, and *Murray cod*. Immense shoals of *herrings* visit the coasts in winter, but no attempt appears to be made to take and preserve them. New South Wales oysters are of excellent quality, and in great request throughout Australia. The chief metropolitan supplies come from the Manning River beds. Among destructive fishes the most noteworthy is the shark family. The insect fauna comprises *beetles*, *butterflies*, *cicadae* (erroneously called *locusts*), *sandflies*, *spiders*, &c.; while reptiles are represented by *lizards* (many of which are beautifully marked and of great size), *fresh-water turtles* and *snakes*, among which the *black snake*, *brown snake*, *tiger snake* and *death adder* are venomous.

Most of the domestic animals of Europe have been introduced into the State, and are found to thrive in their new home. Another European animal—the rabbit—his increased enormously, and has for years been a terrible pest to the squatters, while foxes have also made an appearance.

GEOLOGY.

(For definitions of geological terms see page 146.)

The sedimentary rock formations of New South Wales may be classified in descending order as follows:—

SYSTEM.

WHERE DEVELOPED.

PERIOD.

CAINOZOIC.

POST TERTIARY

Recent.....Gravel, sand, mud, beach deposits, &c., now accumulating.

Pleistocene...Alluvial deposits on the Western Plains, glacial deposits on the Kosciusko Plateau, and raised beaches along the coast.

Pliocene.....Many basaltic districts of New South Wales.

Miocene.....Deep stanniferous leads in the New England district.

TERTIARY

Eocene.....Plant beds near Emmaville and also at Dalton (near Gunning); region around junction of Darling and Murray Rivers.

MESOZOIC OR SECONDARY.

UPPER CRETACEOUS...White Cliffs Opal Fields, Wilcannia

LOWER CRETACEOUS..Artesian water beds in north-western New South Wales.

JURASSIC.....Fossil-fish beds, Talbragar River, about 20 miles north of Gulgong.

TRIASSIC

1. Wianamatta shales...County of Cumberland.

2. Hawkesbury sandstone; Clarence River coal beds.

3. Narrabeen shales...Cliffs near Lake Narrabeen.

4. Artesian water beds...Coonamble, Moree

PALEOZOIC OR PRIMARY.

PERMO-CARBONIFEROUS

1. Upper Coal Measures...Newcastle, Bulli, Lithgow and Sydney.

2. Middle Coal Measures...East Maitland and Tomago.

3. Upper Marine Series....Maitland and Illawarra districts, and Bundanoon.

4. Lower Coal Measures..Greta, West Maitland, and Clyde River.

5. Lower Marine Series..Greta district

CARBONIFEROUS.....Port Stephens district; the Copeland and Bingara goldfields.

DEVONIANMt. Lambie, near Rydal.

SILURIAN.....Jenolan, Wombeyan, and Yarrangobilly Caves; Limestones of Yass and Molong.

CAMBRIAN.....Glacial beds, limestone, &c., of the Broken Hill district.

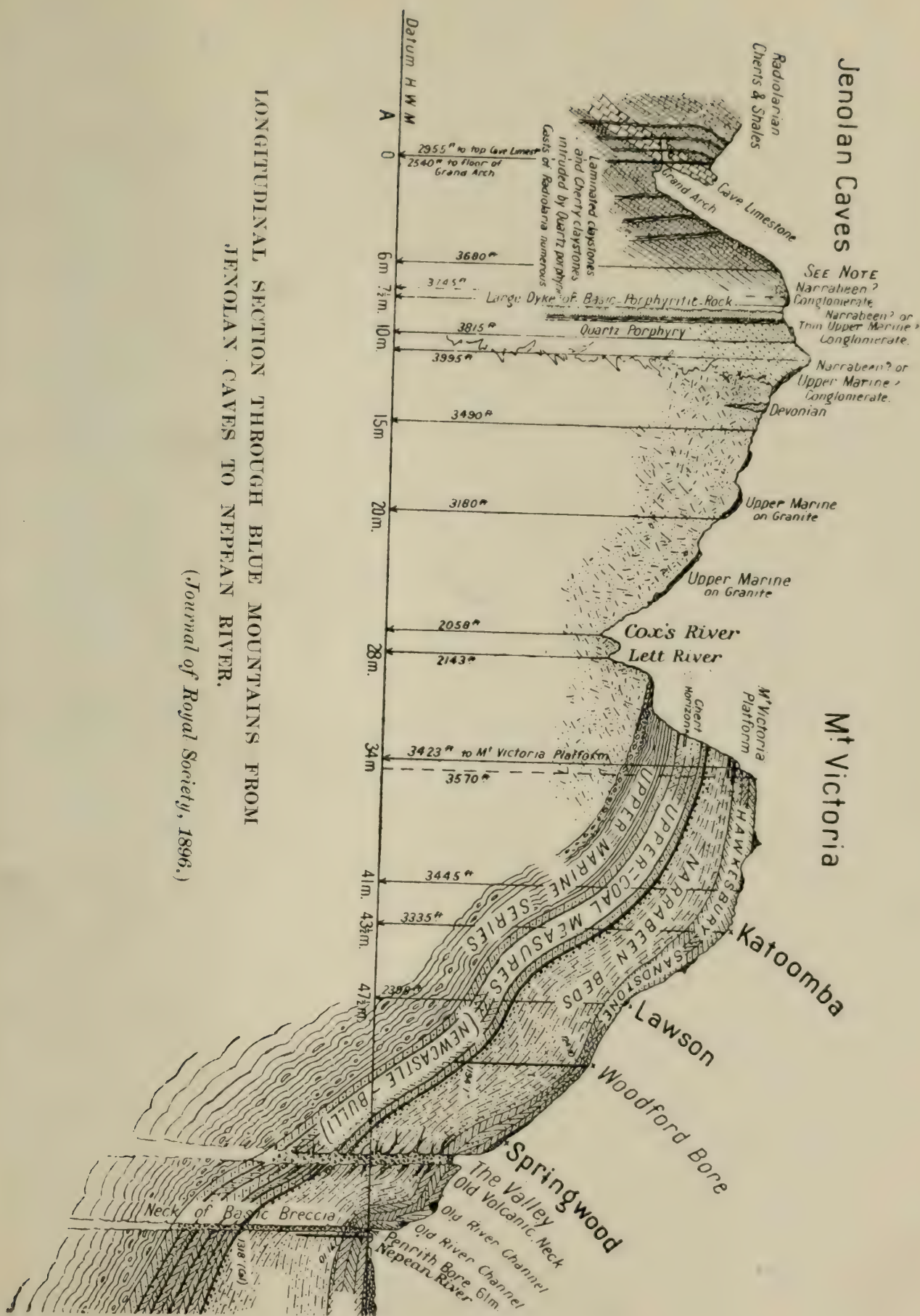
A long belt of *Palaeozoic rocks*, into which granite and other igneous rocks in many places intrude, extends in a general north-easterly direction along the greater part of the Coast District and tablelands, with formations of later date overlying them. This series has an average breadth of about 200 miles. Another belt of primary rocks traverses the central portion of the western plains, from about Condobolin to the Darling, in a direction for the most part at right angles to the eastern belt.

The *Lower Silurian* beds, which are the oldest yet recognised in New South Wales, have been discovered in two localities, viz.:—(i.) On the surveyed boundary line dividing New South Wales from Victoria, between Quinburra and the Pilot Mountain; and (ii.) at Myall Reefs, near Tomingley (north of Peak Hill). These rocks were recognised by the presence of characteristic Lower Silurian graptolites. The extent of these sediments has not yet been defined, but they probably cover large areas.

The *Upper Silurian* beds occur for the most part west of the tablelands in the upper courses of the Murrumbidgee and Lachlan, and extend northwards into the Bathurst, Hill End and Mudgee districts. They also occur in the basin of the Namoi, at Milparinka, near Bateman Bay in the South Coast District, in the basin of the Clyde, in the Upper Shoalhaven Valley, and near the source of the Macleay River. The Upper Silurian rocks consist for the most part of reddish and purplish sandstones, slates, and limestones, and in them occur our chief metalliferous deposits, viz., gold, silver, tin, copper, lead and antimony. The limestone beds, in which the Jenolan, Wellington, Yarrangobilly and Wombeyan Caves occur, as well as the old coral reefs near Yass, are of Silurian age, and are chiefly composed of crinoids and corals which once lived in countless myriads in the warm waters of a deep sea, which at that time covered this portion of New South Wales. The Silurian rocks as a rule have undergone much disturbance, and are generally inclined at a high angle. Silurian

LONGITUDINAL SECTION THROUGH BLUE MOUNTAINS FROM
JENOLAN CAVES TO NEPEAN RIVER.

(*Journal of Royal Society, 1896.*)



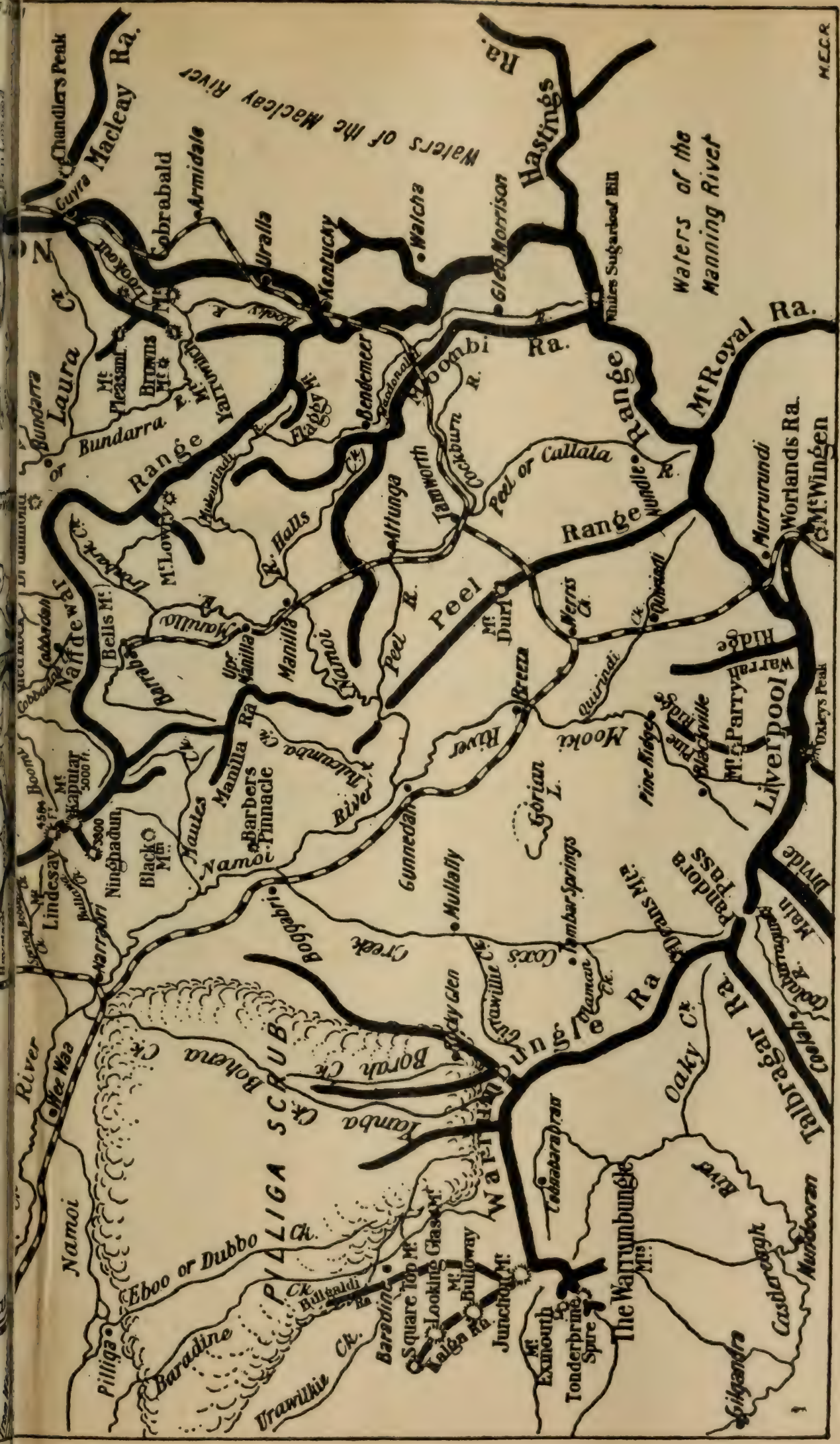
fossils may be found in abundance near Yass, which is the "type district" for rocks of this age.

Rocks of *Devonian* age are well developed near Rydal, and along the base of the western escarpment of the Blue Mountains between Capertee and Hartley. Upper Devonian rocks form the summits of Mount Lambie and Mount Walker, and have also been found on the Cudjegong and Turon Rivers and in parts of the Yass and Goulburn districts. Rocks of this age, like those belonging to the Upper Silurian period, are traversed by metalliferous lodes and quartz reefs in the vicinity of intrusive dykes. Like the Silurian rocks, they also are folded, but not usually tilted very greatly from their original positions. At Tarago, in the Goulburn district, and at Brombee and Wilbertree, near Mudgee, deposits of limestone occur which contain both Silurian and Devonian fossils, and have consequently been classed provisionally as *Silurian-Devonian Passage Beds*.

The *Carboniferous* strata are extensively developed between the Hunter and Manning Rivers, where they form high, broken ranges. They consist of conglomerates, sandstones, limestones and shales, tilted at all angles. These are all of marine origin, and are interbedded with tuffs and lavas and intersected by metalliferous lodes containing gold, silver, copper, lead, antimony, &c. The Copeland and Bingara goldfields are situated in rocks of Carboniferous age. With the exception of the beds of iron-ore associated with Permo-Carboniferous rocks at Wollongong, Wallerawang, and a few other places, no *lodes* containing metals of economic value are met with, as far as is known, in any rocks of later age than the Carboniferous. Throughout the whole extent of the Carboniferous formation no workable coal seam occurs. The seams met with are too full of bands and are of too dirty a character to be of any economic value; in fact, no workable coal seams occur in New South Wales below the Permo-Carboniferous formation.

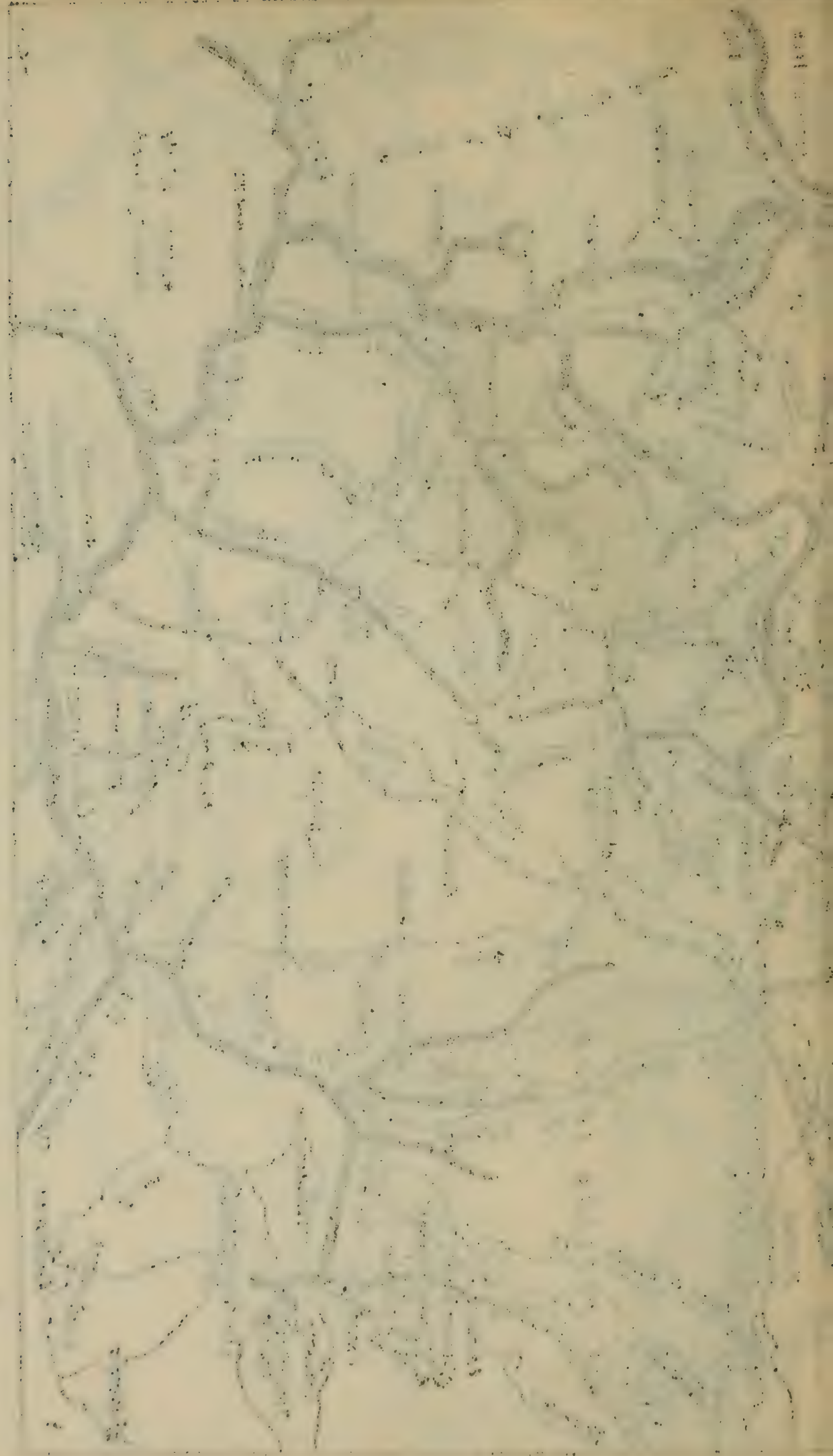


This is a detailed historical map of the Macintyre River region in New South Wales, Australia. The map shows the Macintyre River flowing from the north, with numerous tributaries including the Severn, Murrumbidgee, and various creeks like Gilgah, Whalan, and Boggabilla. Key locations marked include Macintyre, Murrumbidgee, and various towns and stations. The map also shows the Macintyre Range and the Macintyre River crossing the border into New South Wales.

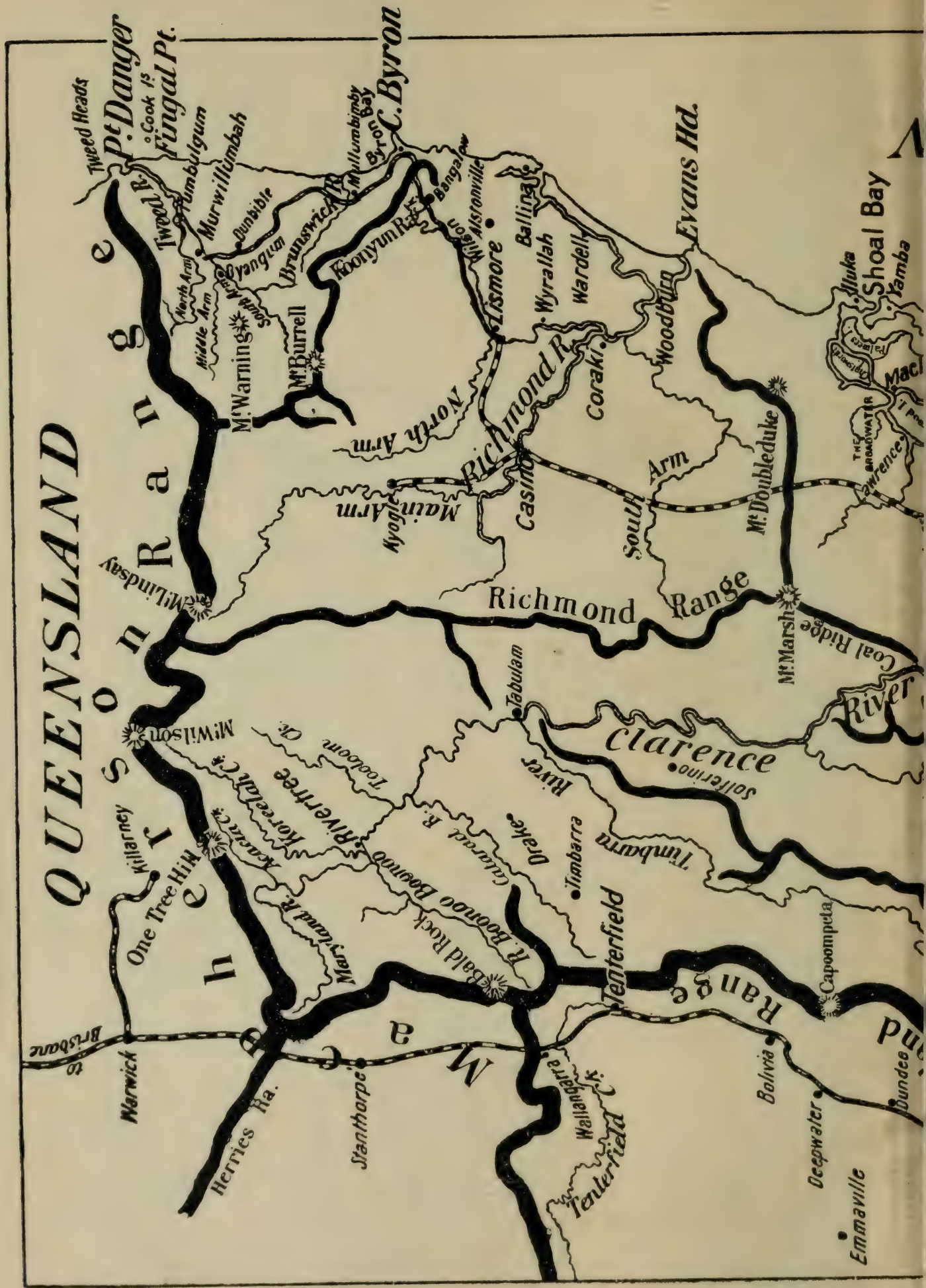


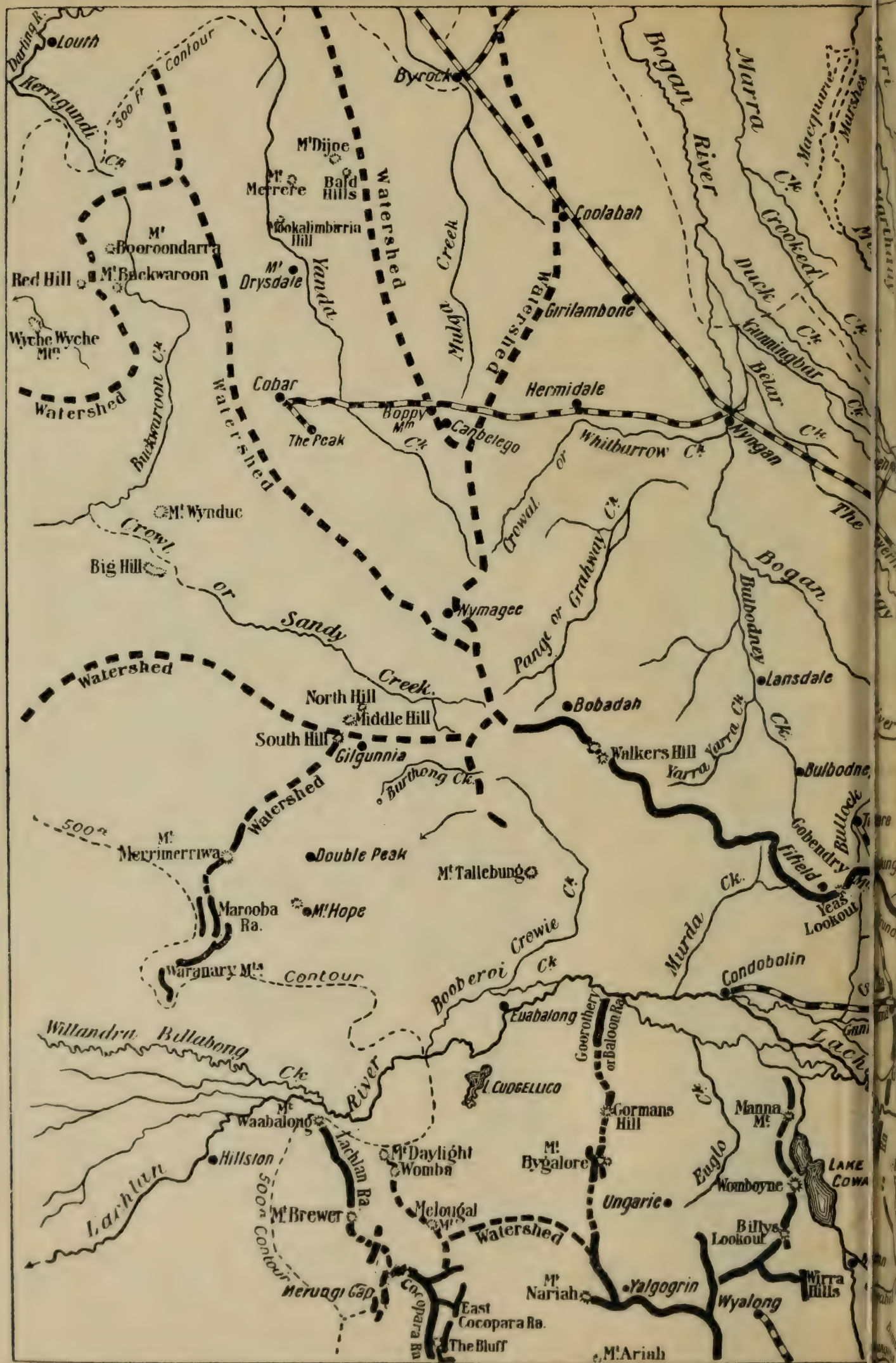
TABLELAND AND WESTERN SLOPE—NORTHERN SECTION.

M.C.R.









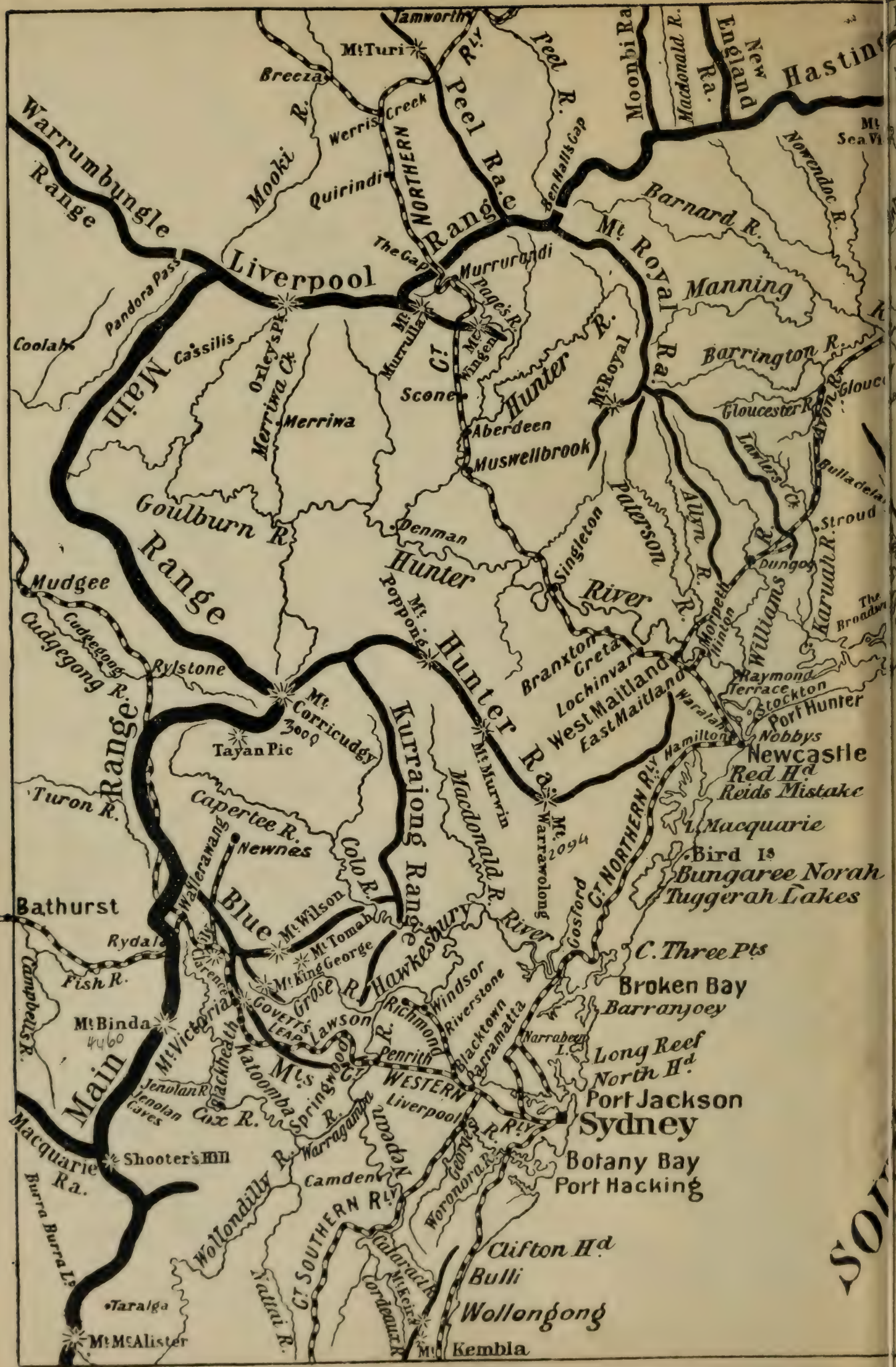
Map 3.



NECA

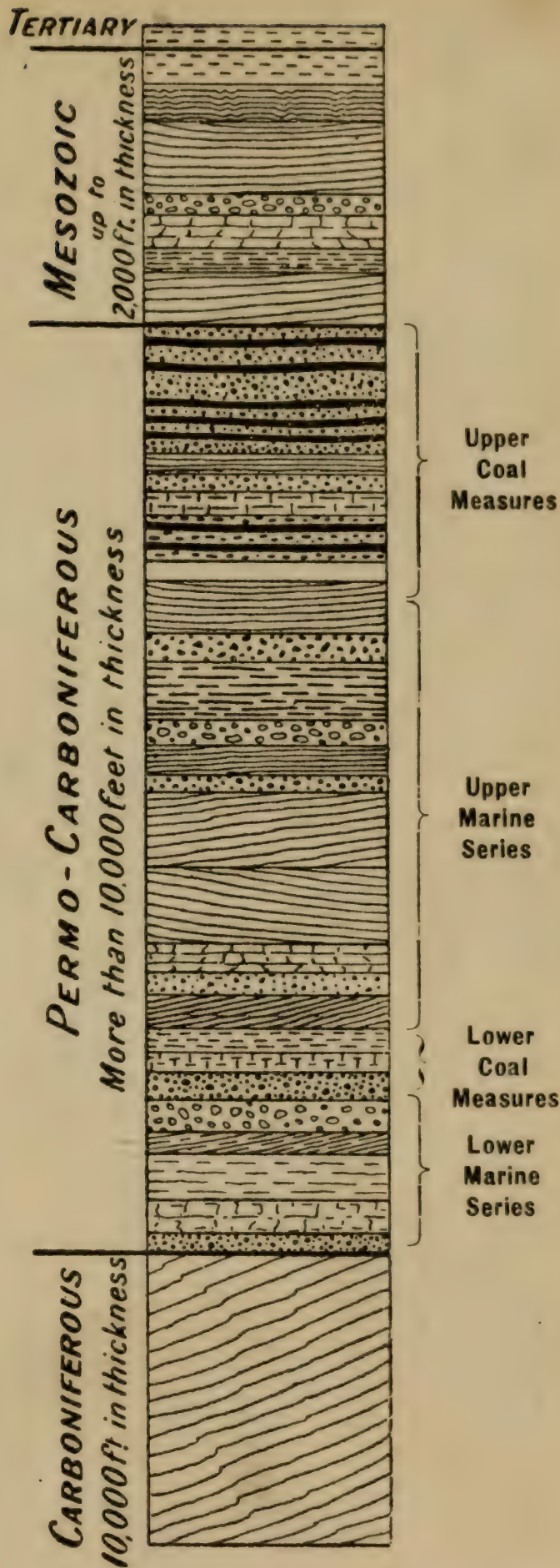
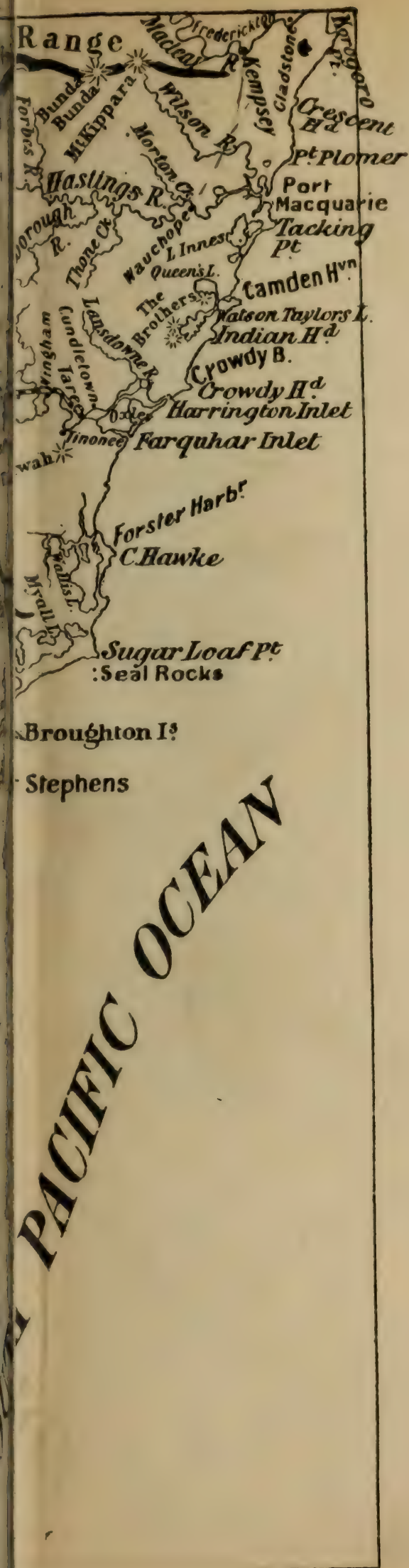




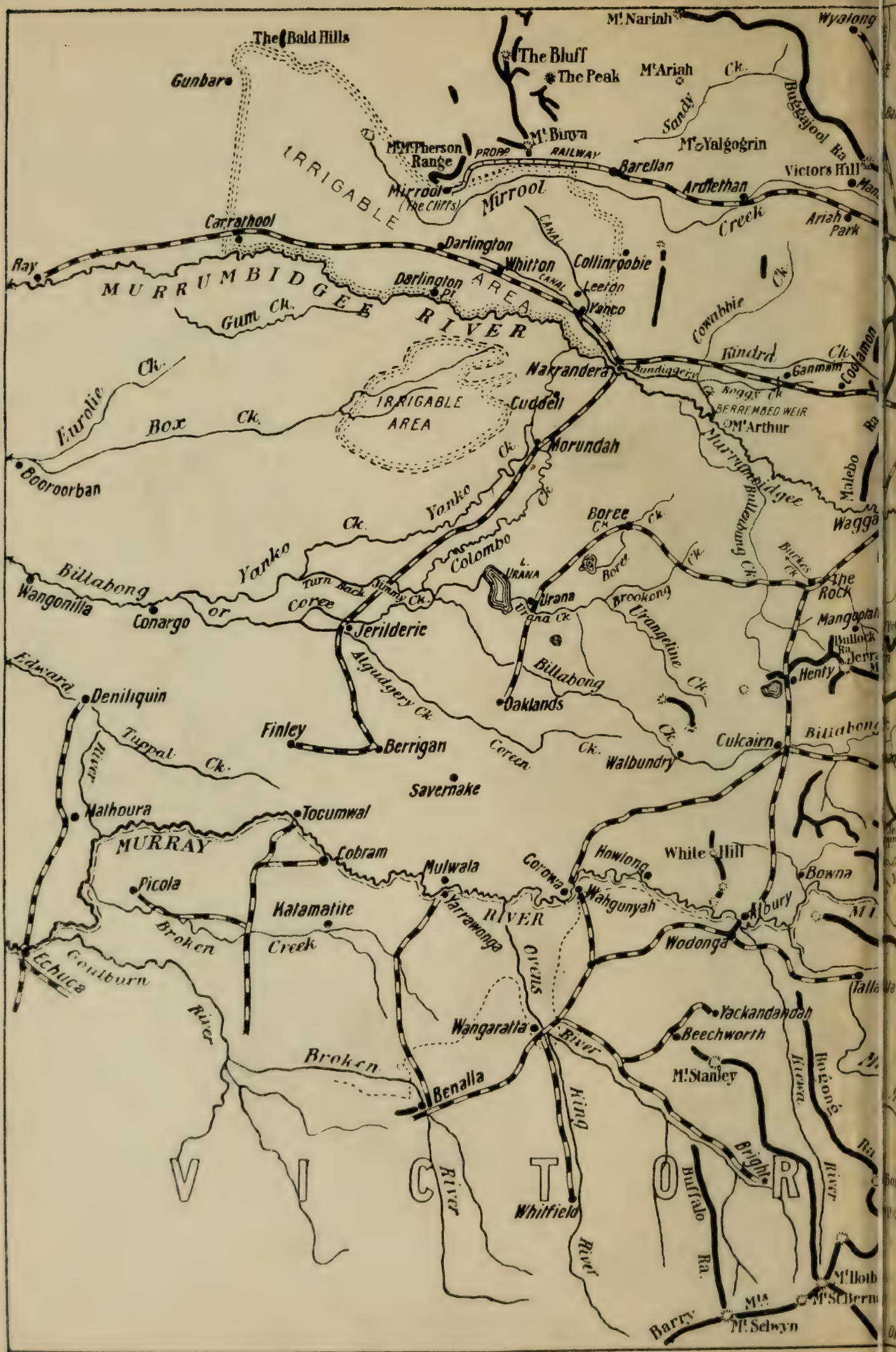


COASTAL DISTRICT—CENTRAL SECTION.

Map 4.



SUCCESION OF COAL-BEARING ROCKS IN NEW SOUTH WALES.

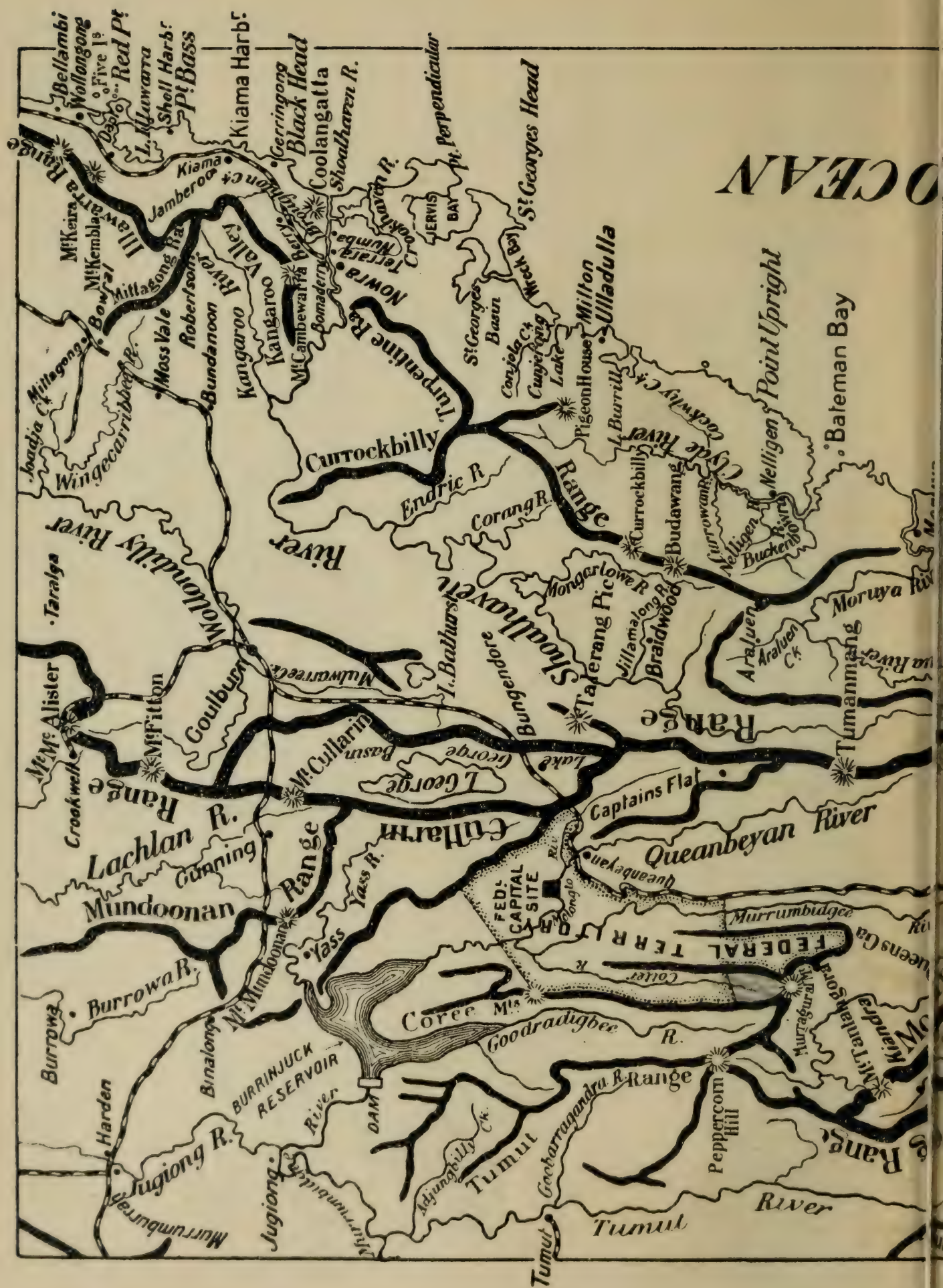


Map 5.



H.E.C.R.

Map 6.

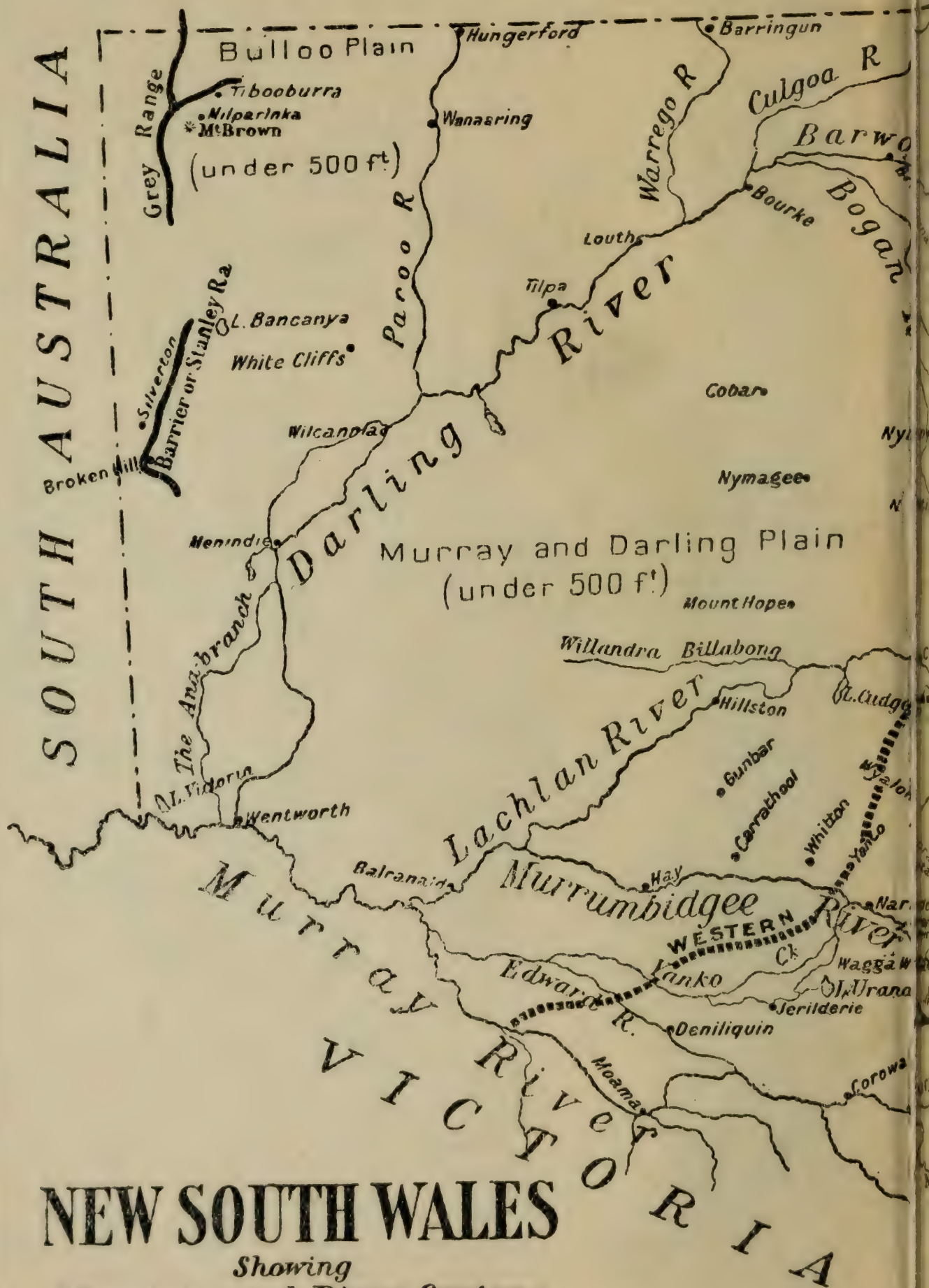


SOUTH PACIFIC

Montague I.



QUEENSLAND



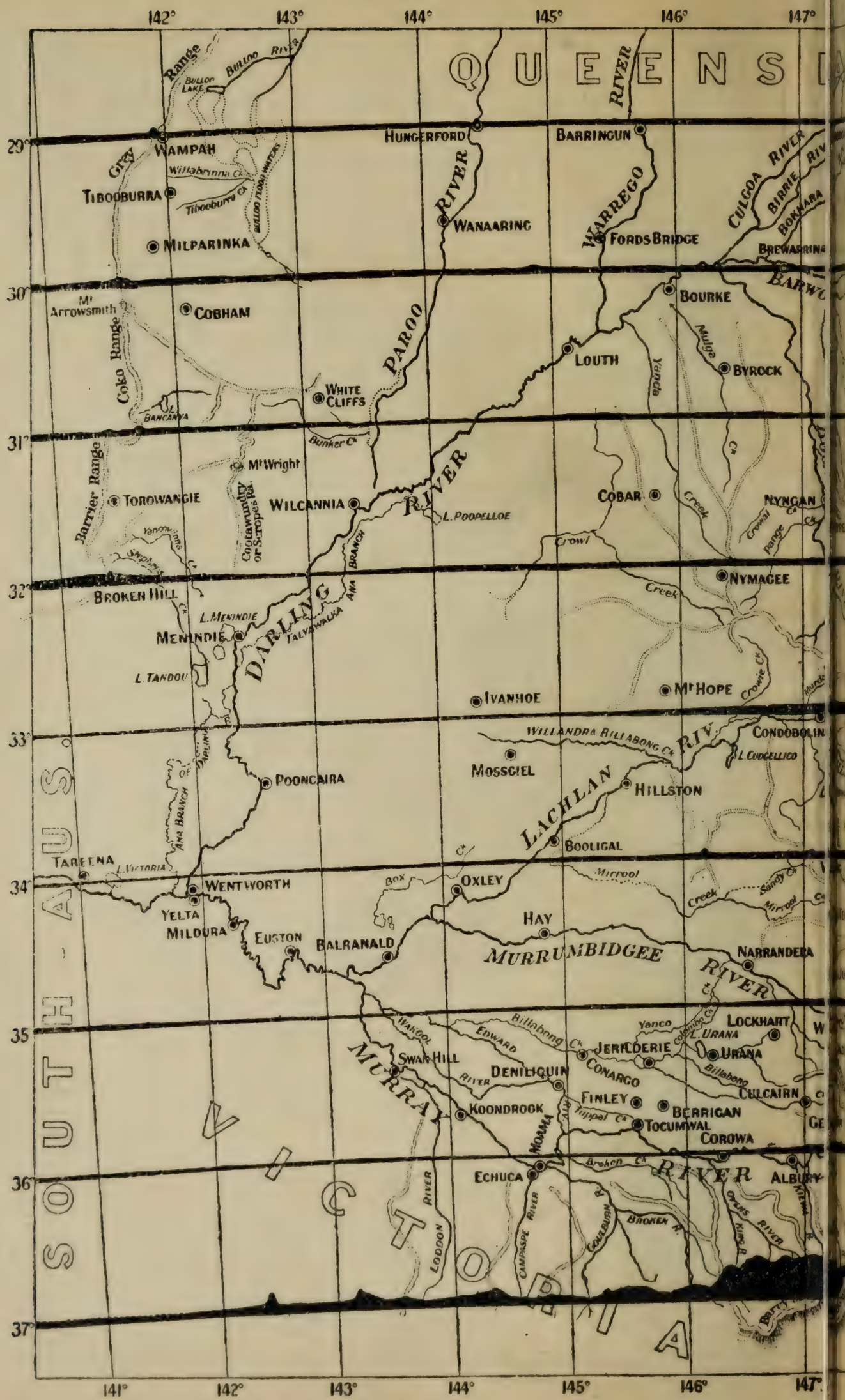
NEW SOUTH WALES

*Showing
Mountain and River Systems*

Map 7.







Map 8.





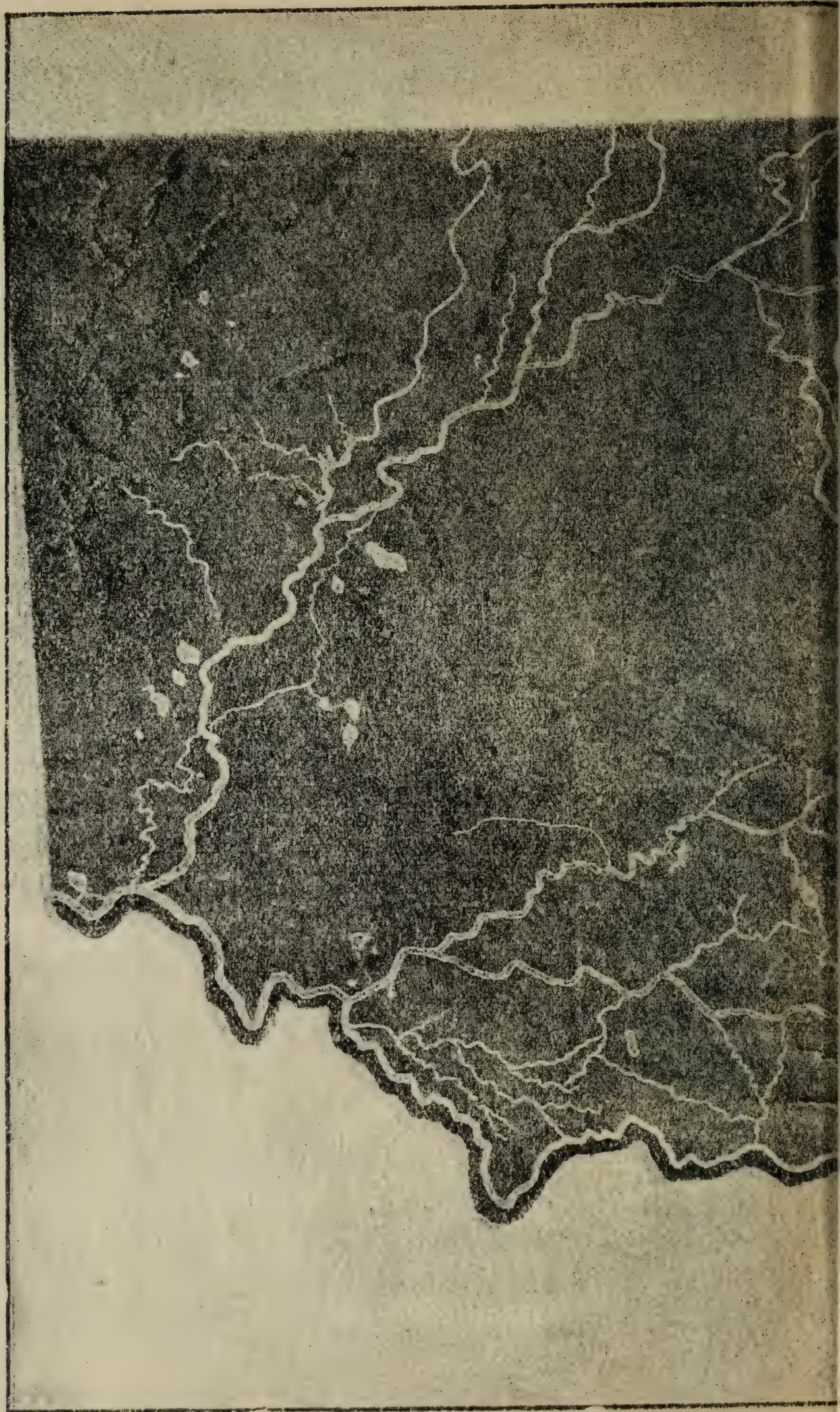


Map 9.





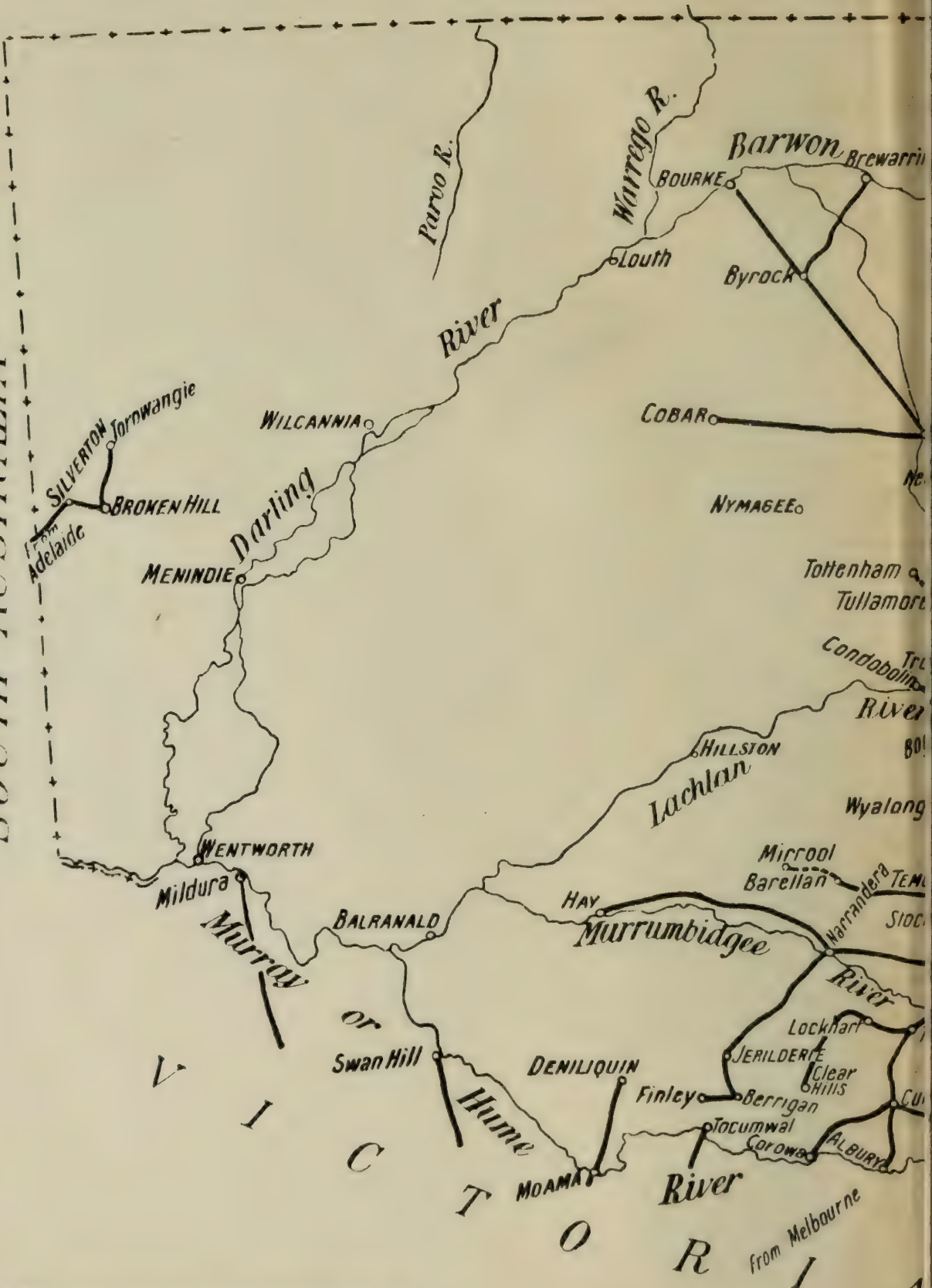






Q U E E N

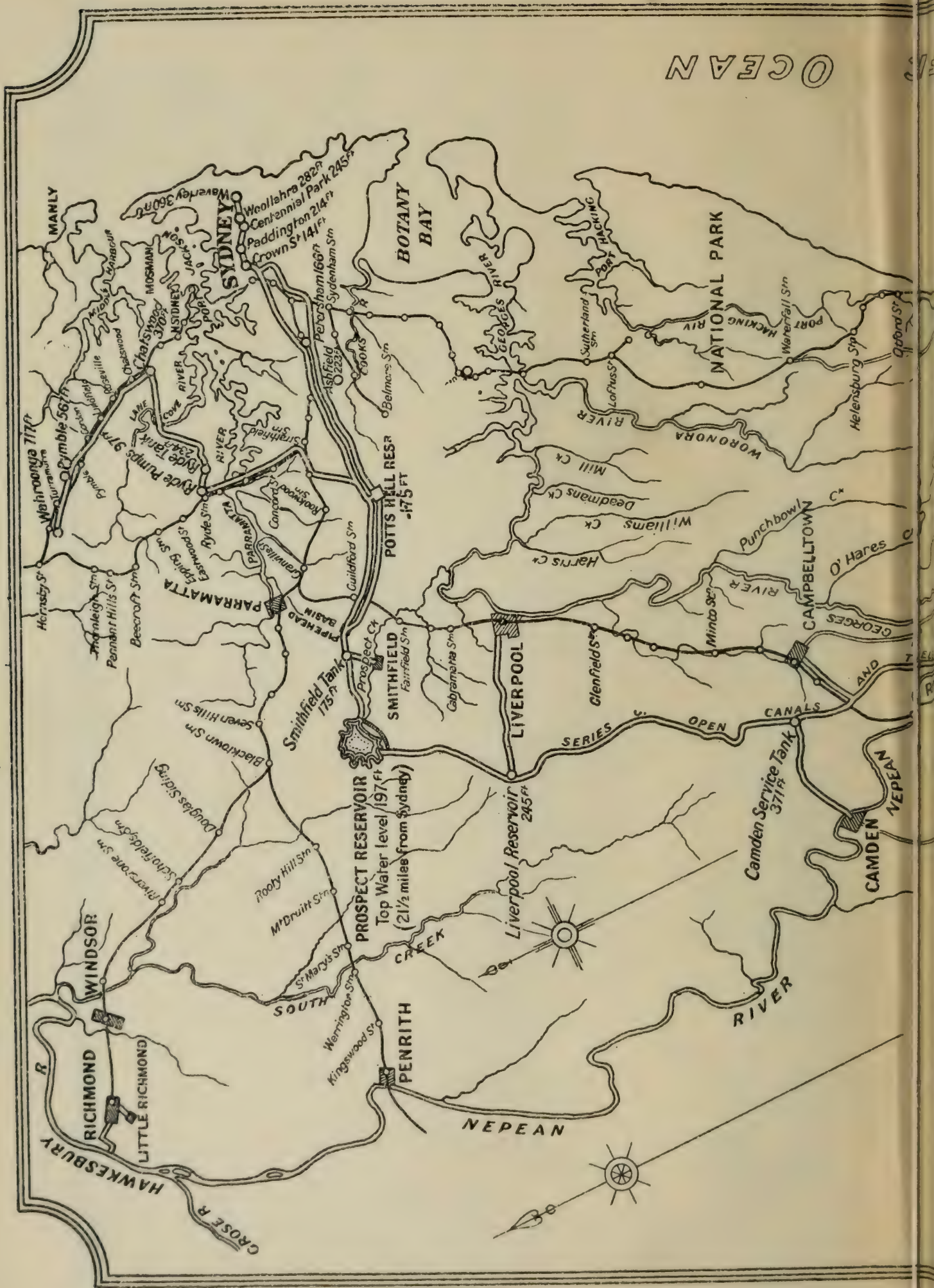
SOUTH AUSTRALIA



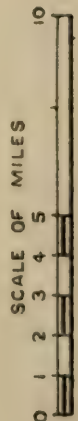
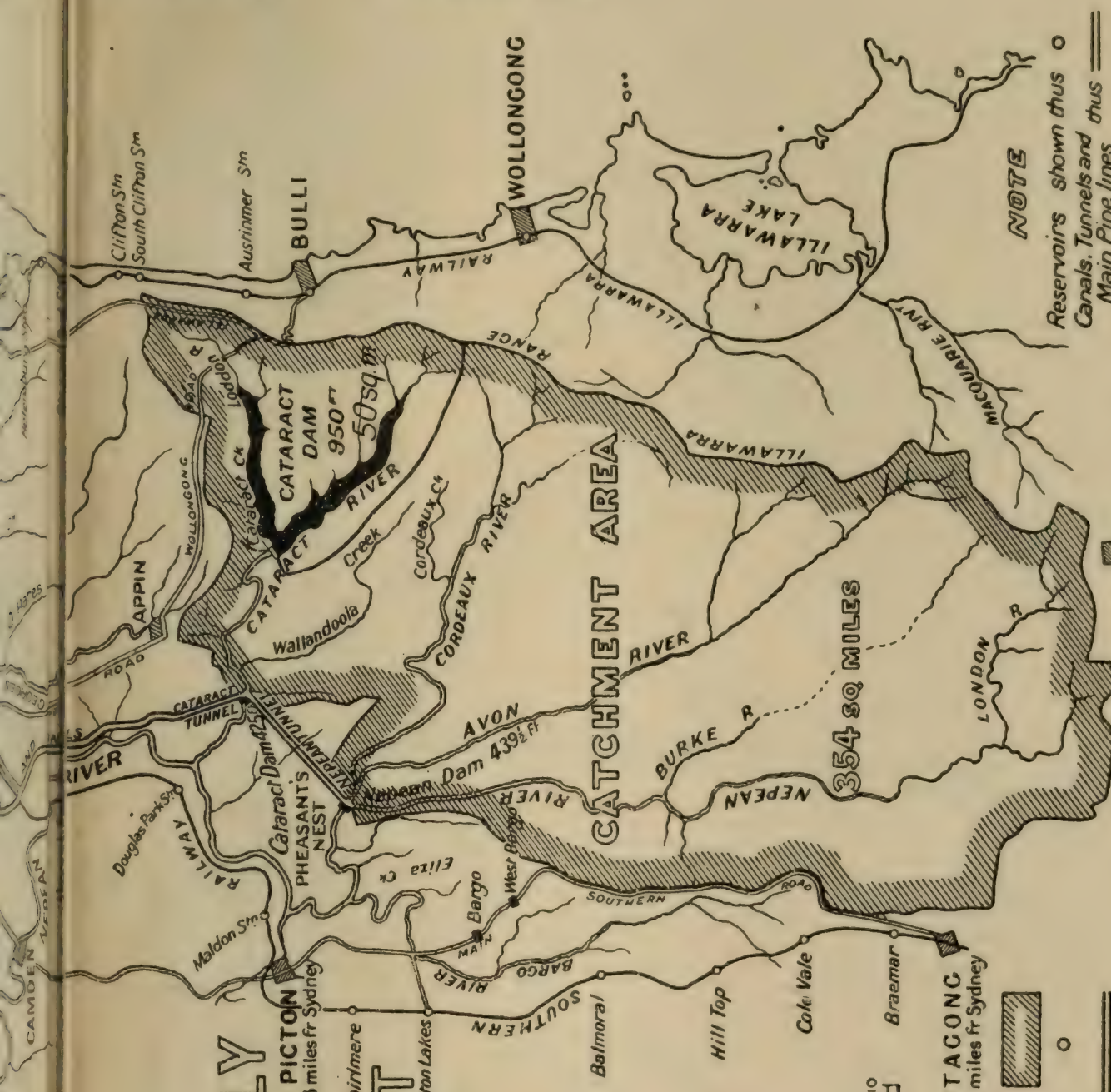
Note. Numbers after capes, bays, etc. indicate distance in miles by sea from Sydney.

Railways shown thus ———
Do under construction - - - - -





SYDNEY WATER SUPPLY AND CATCHMENT AREA

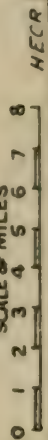


NOTE

Catchment area shown thus
Reservoirs shown thus
Canals, Tunnels and Main
Pipe lines shown thus

MITTAGONG
77 miles fr Sydney

ROBERTSON
100 miles fr Sydney via Moss Vale



NOTE

Reservoirs shown thus
Canals, Tunnels and
Main Pipe lines

HEAR



ARAFURA SEA

Palmer

Pine C

NORTHERN

TERRITORY

Proposed Land Grant Railway

SOUTHERN

WESTERN AUSTRALIA

Nannine

Cue

Northampton

Valgou

Geraldton

Menzies

Kalgoorlie

Proposed

Railway

Coolgardie

Southern Cross

Newcastle
Northam

Perth
Fremantle

Bushy

Busselton

Bridge town

Albany

GREAT AUSTRALIAN HIGH

RAILWAYS

OF

AUSTRALIA

INDIAN OCEAN

INDIAN OCEAN

Cable from
Batavia (Java)

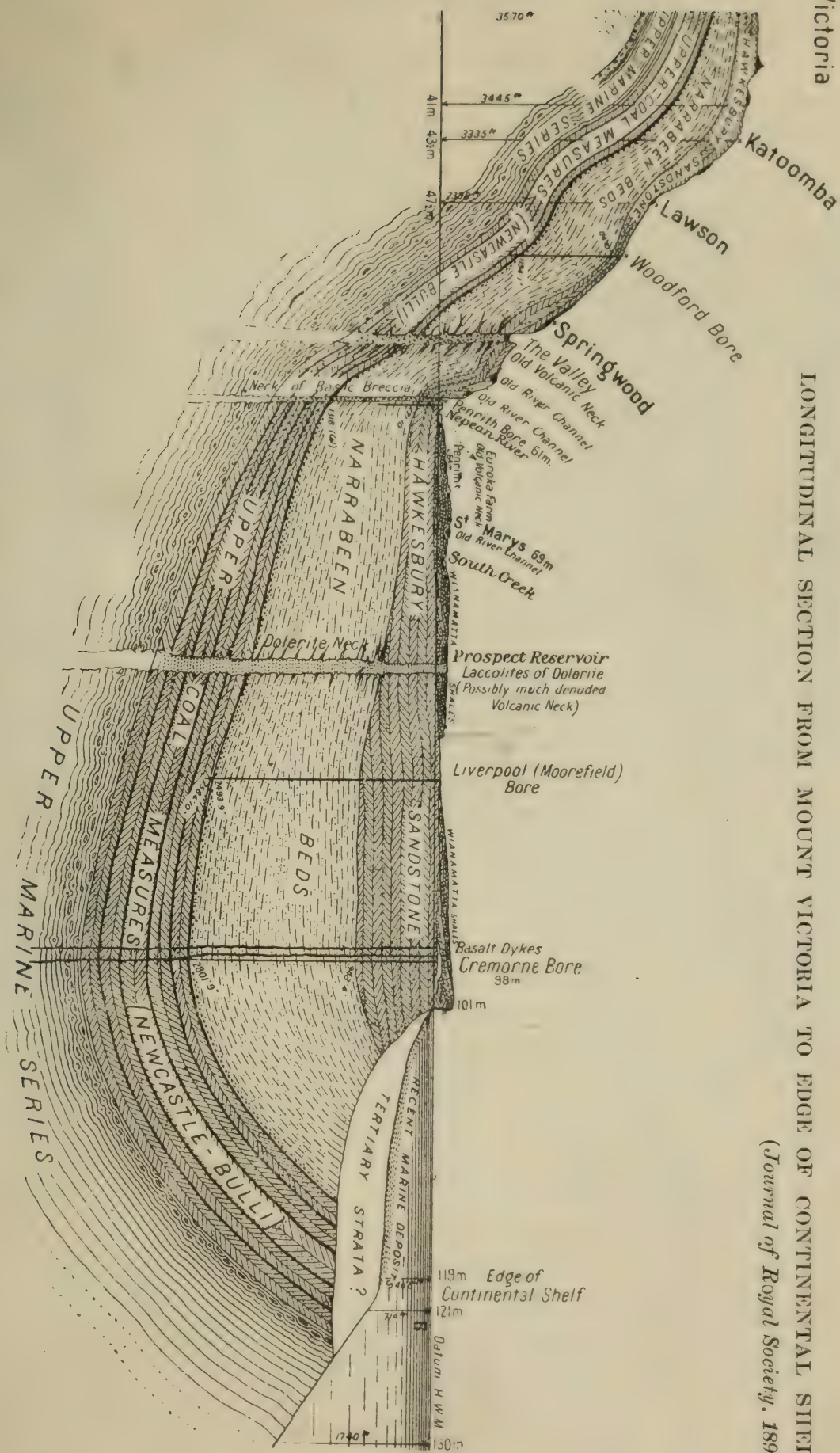
Cable from
Batavia (Java)

Cable from
Cocos I.



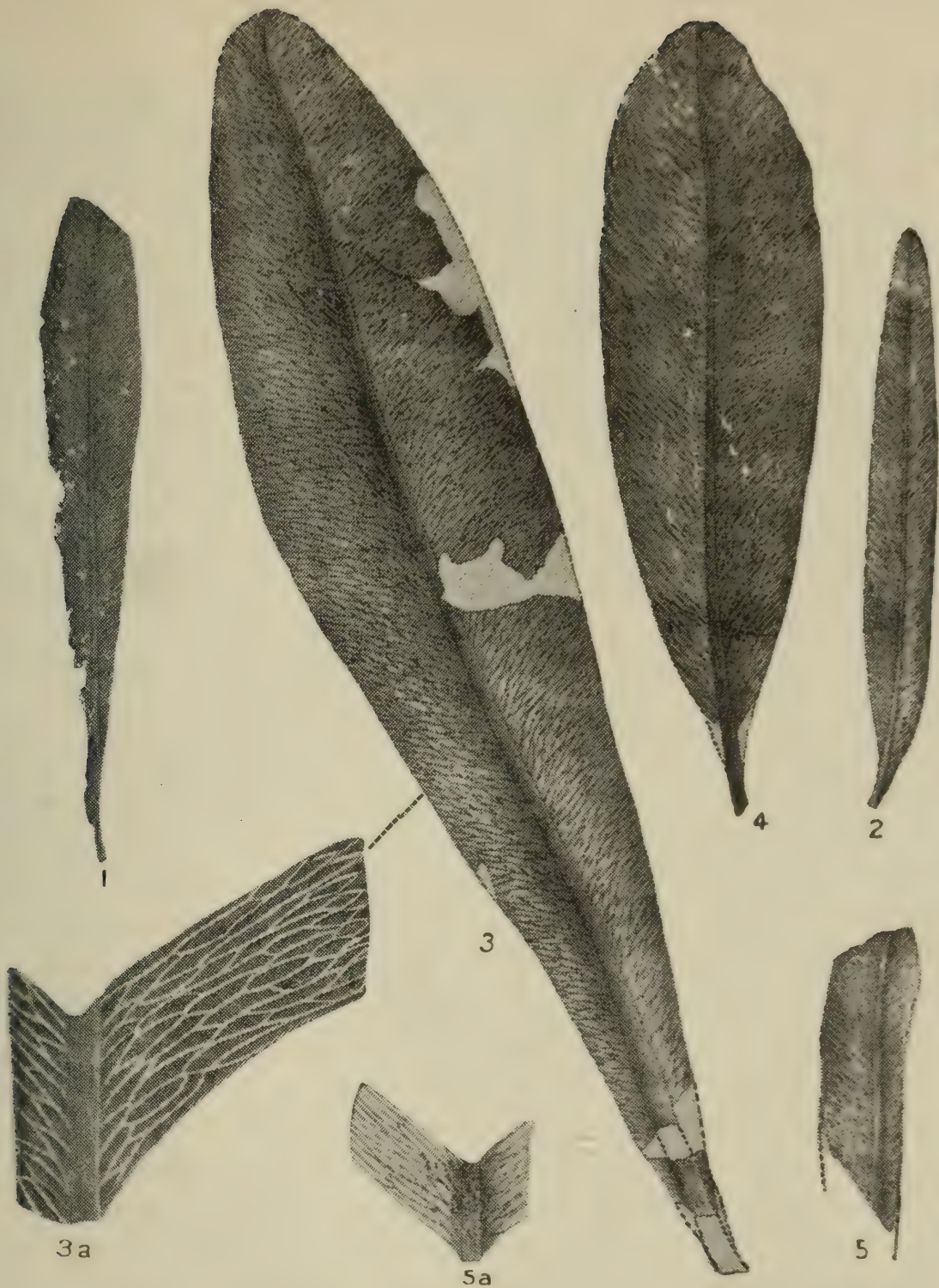
LONGITUDINAL SECTION FROM MOUNT VICTORIA TO EDGE OF CONTINENTAL SHELF.

(*Journal of Royal Society. 1896.*)



The term *Permo-Carboniferous* is applied to an extensive series of New South Wales strata containing fossil remains, both of the Permian and Carboniferous types.

The system extends along the coast between the Clyde and Hunter River districts, and stretching inland to Lithgow and Mittagong, on the Southern Tableland. It contains the State's enormously productive coal seams. The Permo-Carboniferous system comprises in descending order (i.) The Upper (*i.e.*, Newcastle, Illawarra and Lithgow) Coal Measures; (ii.) the Middle (*i.e.*, East Maitland or Tomago) Coal Measures; (iii.) the Upper Marine Beds; (iv.) the Lower (*i.e.*, Greta and Clyde River) Coal Measures; and (v.) the Lower Marine Beds. The rocks of the series form an enormous basin, dipping from Newcastle southwards to Sydney (which appears to form the centre of the basin), thence rising gradually towards the surface. The Upper Coal Measures, for instance, which are found at the surface at Newcastle, dip southwards towards Sydney (where they are 3,000 feet below the surface), rise again further south, and reappear at Clifton and Bulli, in the Illawarra district. They continue to rise through Illawarra as far south as the Cambewarra Mountains, where they crop out at an elevation of 1,500 feet in the face of the ranges. In the Newcastle district the six more important seams belonging to the Upper Coal Measures are, in descending order, the following: (i.) Parbury's seam; (ii.) Great Northern seam; (iii.) Burwood seam; (iv.) Dirty seam; (v.) Yard seam; and (vi.) Borehole seam. The Upper Coal Measures extend westwards to the Lithgow district. Deposits of kerosene shale occur in them at Joadja, Hartley and Capertee. The East Maitland or Tomago Coal Measures—so called because they are developed and worked in those districts—underlie the Newcastle Coal Measures, from which they are separated by a well-defined formation 2,000 feet in thickness, to which the name of the *Dempsey Beds* has been given. They also dip southward from the Hunter River district, but probably thin out as they proceed, for they



PERMO-CARBONIFEROUS FOSSILS*—NEWCASTLE BEDS.

- 1, 2. *Glossopteris linearis*, McCoy. Newcastle, Upper Coal Measures.
3. *Glossopteris Browniana* Bgt. Bowenfels, New South Wales.
- 3a Part of Fig. 3, enlarged to show the venation.
4. The same with somewhat narrower meshes. Newcastle Upper Coal Measures.
5. *Glossopteris angustifolia* Bgt. Blackman's Swamp, New South Wales. Newcastle Beds.
- 5a Part of Fig. 5. enlarged to show venation.

* From Feistmantel's Coal and Plant-bearing Beds of Eastern Australia, Sydney, 1890.

have not been recognised in Illawarra. The Upper Marine Beds are about 5,000 feet thick, and are usually divided in descending order as follows: (i.) Crinoid Beds; (ii.) Spirifer Beds; (iii.) Muree Rock; and (iv.) Conglomerates. They may be seen extensively developed in the Maitland and Illawarra districts. Underlying the Upper Marine Series are the Greta (or Clyde River) Coal Measures. The coal seams belonging to this series are worked at Greta and throughout the South Maitland coalfield. They probably dip southward towards Sydney, and rise again on approaching Illawarra, but they do not appear above sea-level till they reach the valley of the Clyde River, in the Ulladulla district. The Lower Marine series attain a thickness of about 2,000 feet, and are extensively developed in the Greta district. One of the most characteristic plant fossils of the Permo-Carboniferous period is the *Glossopteris*.

The *Mesozoic* rocks of New South Wales comprise the *Triassic* and *Cretaceous* formations, the former consisting of the *Wianamatta Shales*, the *Hawkesbury Sandstone*, the *Narrabeen Shales*, and the *Clarence River Coal Measures*. The *Wianamatta Shales*, the *Hawkesbury Sandstone* and the *Narrabeen Shales*, taken together, form what is known as the *Hawkesbury Series*. The *Narrabeen Shales* are overlain by the *Hawkesbury Sandstone*, and dip inland towards the south-west, thinning out as they proceed. They consist of red, chocolate, blue and grey shales, and form the prominent cliffs along the coast north of Sydney, from Long Bay Reef (near Narrabeen) to Broken Bay; they may also be seen in the district north of Clifton, through which the South Coast Railway passes, and along the face of the Illawarra Range as far south as the Saddleback Mountain, south-west of Kiama. Numerous impressions of plant-remains, as well as a crustacean *Estheria Coghlani*, occur in the *Narrabeen Shales*. Their reddish colour is due to the presence of oxide of iron derived from the volcanic dust which was doubtless blown from volcanoes in eruption during their deposition. The *Hawkesbury Sandstone* extends from Sydney on all sides for a distance of about



SCENE IN TRIASSIC TIMES, SHEWING THE ASPECT OF COUNTRY WHERE SYDNEY NOW STANDS.
The drawing shows *Labyrinthodonta*, and such fossil plants as *Mucrotenuipteris*, *Thinnfeldia*, and *Phyllothea* restored.

From Curran's *Geology of Sydney*.

70 miles, and, roughly speaking, comprises the whole valley of the Hawkesbury River. It consists of greyish and yellowish-white sandstone, which is extensively used for building purposes. Indeed, Sydney, which is built upon these rocks, has been described as "a city surrounded by a wilderness of sandstone quarries." The Hawkesbury Sandstone is of estuarine origin and contains the remains of fish and plants, the most characteristic of the latter being the *Thinnfeldia odontopteroides*. The thickest portion of the formation is at Sydney. Within it, too, appear the magnificent gorges of the Blue Mountains and the extensive harbours of Port Jackson and Broken Bay, which are in reality old river valleys (like the Grose Valley in the Blue Mountains) that sank probably at the close of the Tertiary epoch along with the whole of the adjacent coastal district.

The Wianamatta Shales appear to have been deposited in hollows worn by denudation out of the Hawkesbury Sandstone, which they overlies for several miles north, west and south of Sydney. They are of fresh water origin, and form the cappings of the hills throughout the greater part of the County of Cumberland. A small outlier of these shales, 80 feet in thickness, is met with overlying the Hawkesbury Sandstone at Springwood, in the Blue Mountains, and an outlier of the Hawkesbury Sandstone itself occurs near Dubbo. Much importance, from an economic point of view, attaches to the Wianamatta Shales on account of their extensive use in brick and pottery making. Wianamatta is the aboriginal name for South Creek, a small tributary of the Hawkesbury, where the Rev. W. B. Clarke found the shales well-developed. On the Clarence and Richmond Rivers occurs a series of rocks of about the same age as the Hawkesbury Sandstone, and known as the *Clarence River Coal Measures*. The coal seams of the Clarence River do not possess much economic value, although the coal-bearing formations of Queensland are of the same age, viz., Triassic.

As far as is known, rocks of *Jurassic* age occur in only one locality in New South Wales, viz., about 20 miles north



THINNFIELDIA · ODONTOPTEROIDES* (MORRIS).

A characteristic fossil plant from the Hawkesbury Sandstones.

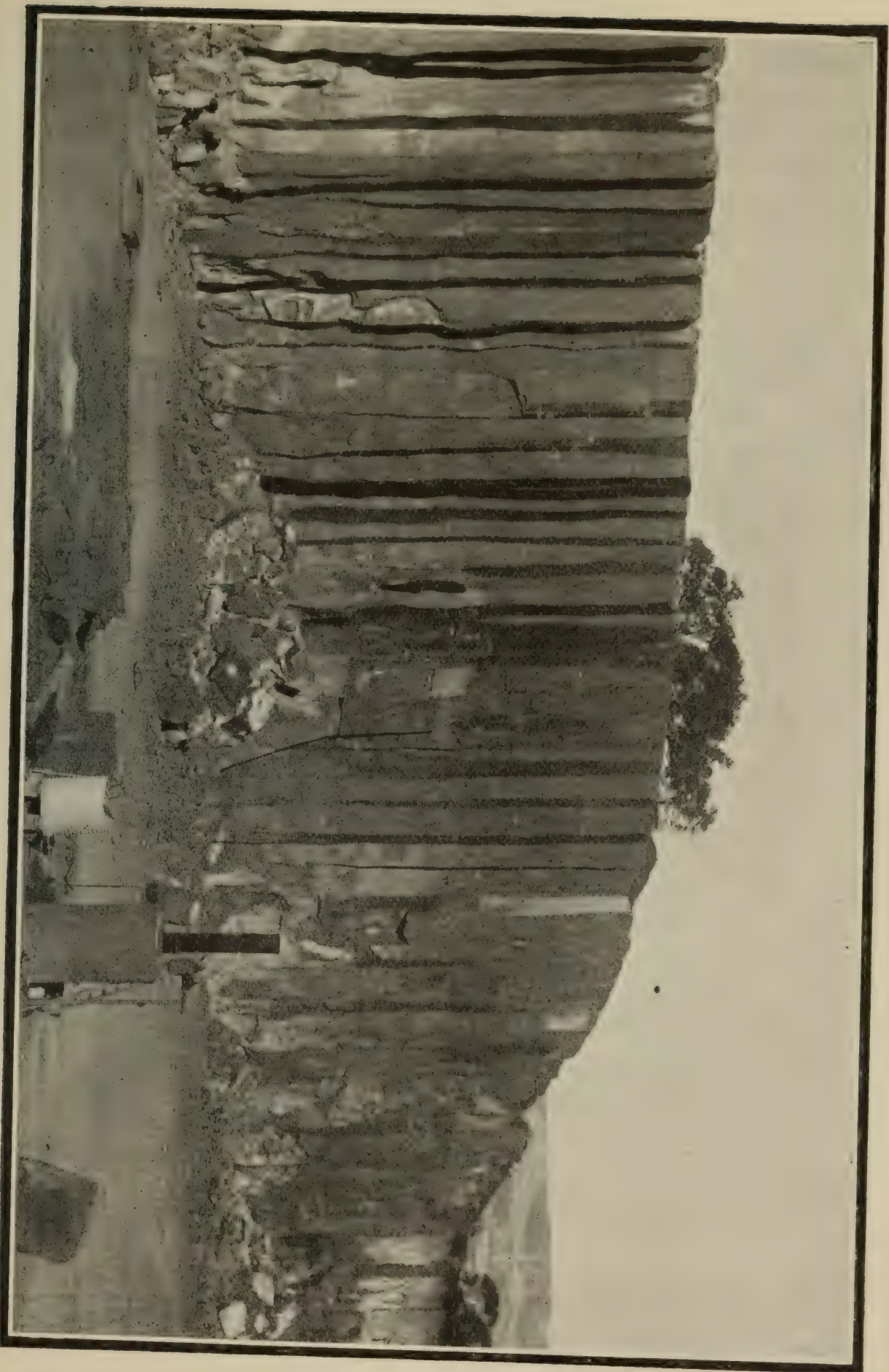
* Feistmantel's Coal and Plant-bearing Beds of Eastern Australia and Tasmania, 1890.

of Gulgong. They consist of a small deposit of yellowish shales believed to be of lacustrine origin, and to have been deposited in a denuded hollow in the Hawkesbury Sandstone.

The *Cretaceous* formation is of great economic importance, as from it was derived the first artesian water struck in the State. The *Lower Cretaceous* rocks are developed in the north-west, and occupy the greater part of the basin of the Upper Darling and its tributaries, and throughout a considerable area overlies the Triassic water-bearing formation. They have yielded in the past and continue to yield abundant supplies of artesian water, which is now largely availed of by the squatters for stock purposes, the total yield from these bores being upwards of 60 million gallons daily. Previous to 1894 it was supposed that artesian water would only be found in the Cretaceous formation, but an examination of fossils from the strata pierced by the Coonamble, Salisbury Plains and Morec bores has proved that rocks of Triassic age in New South Wales are also water-bearing, and it is believed by some that they are the real source of our artesian water supplies. The eastern outcrop of the Triassic rocks of Queensland crosses into New South Wales a few miles west of the township of Texas (on the border, and about 70 miles directly west of the Wallangarra), and trends south-west towards Dubbo. Along this course the outcrop "occupies more or less high altitudes, and is fed in places by heavy rainfalls, which are the source of the artesian water supply. The dip of these rocks is westerly, and it appears, therefore, that they must underlie the Cretaceous rocks for a considerable distance under the north-western plains, if indeed they do not extend continuously to Leigh's Creek in South Australia, where they are known to exist, and where they contain very thick deposits of coal."

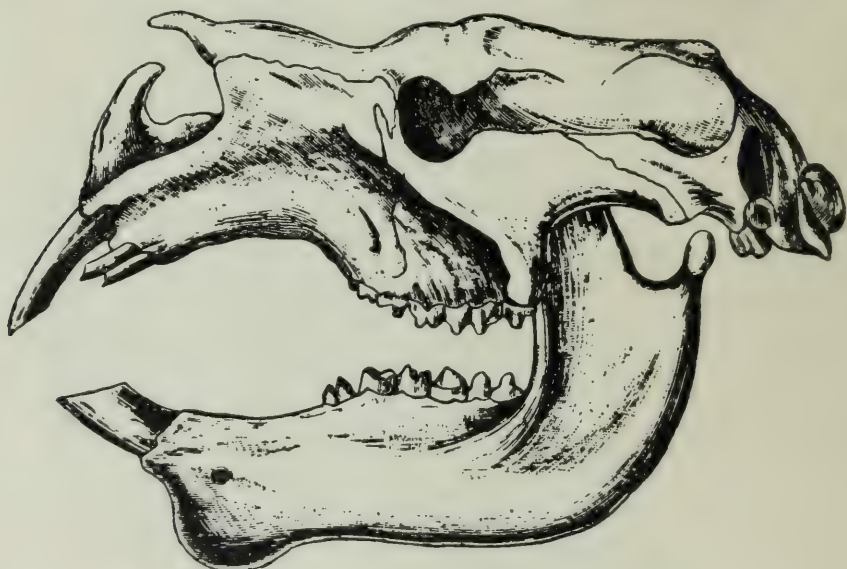
In the *Upper Cretaceous* formation occur the rich deposits of precious opal, now worked at White Cliffs, in the Wilcannia district.

Tertiary and *Post-Tertiary* deposits cover about one-



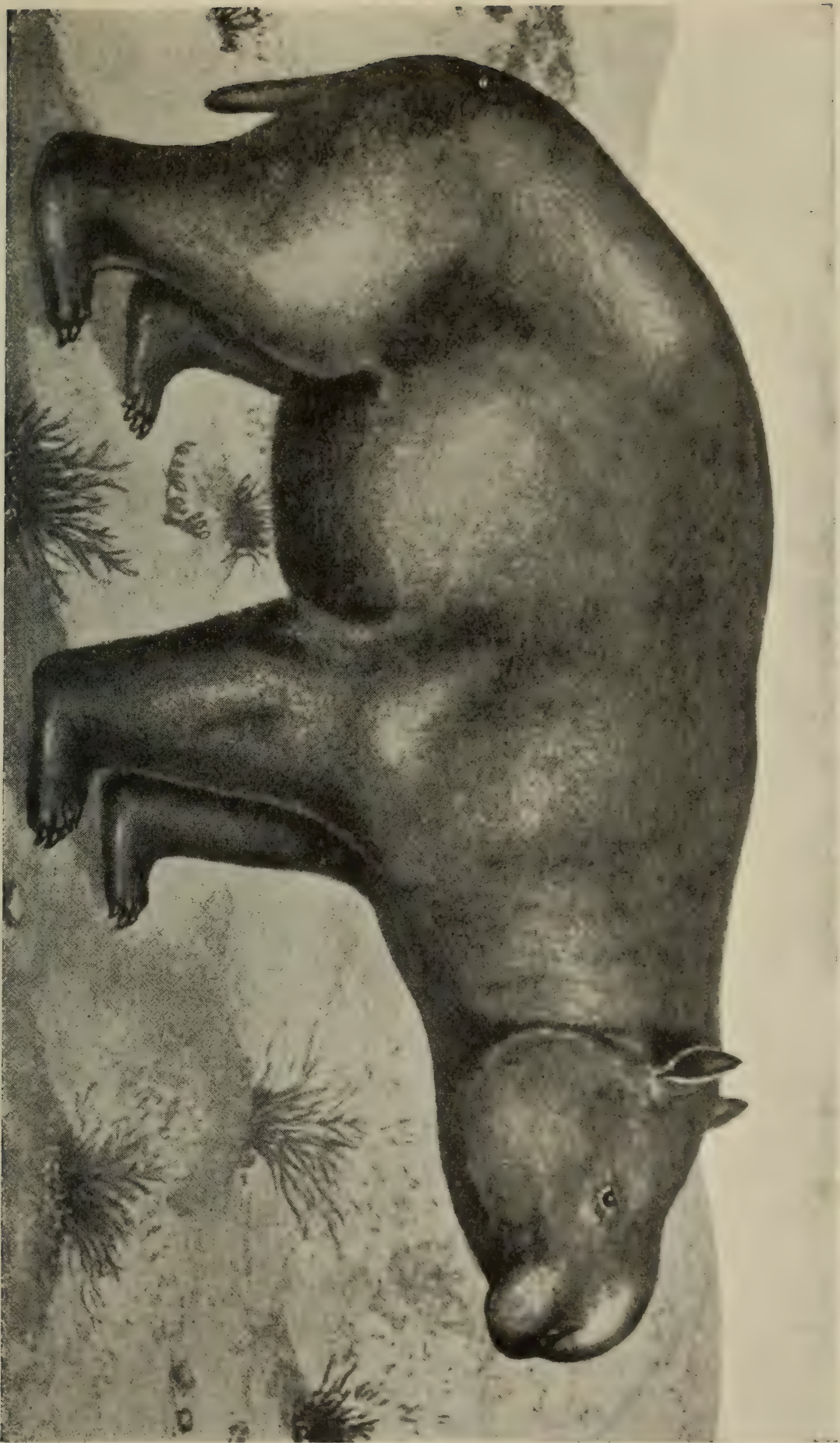
COLUMNAR BASALT—KIAMA.

third of the whole area of New South Wales, embracing the valleys of the great western rivers and their tributaries. One great break occurs in these formations, viz., in the Great Plains, where a broad belt of Silurian rocks extends westwards between the Bogan River and the Barrier Ranges. The Tertiary fluviatile deposits are of the highest economic importance, for they have yielded and continue to yield our chief supplies of alluvial gold, stream tin and gems. During the middle and later Tertiary periods this portion of the world experienced abnormally heavy rainfall, as is evidenced by the great width of many old river channels, and, as a consequence, the older rocks were sub-



SKULL OF *Diprotodon Australis* (AFTER OWEN).

jected to a correspondingly great amount of denudation. As a result the gold and tin which they contained were carried down by the action of running water, and concentrated in Tertiary leads, whence they are obtained at the present time. During the *Pliocene* period great volcanic activity prevailed, and “many of the watercourses, together with the plants and animals that lived upon their banks, were overwhelmed by streams of lava. Examples of these deep leads (which are in truth fossil river-beds) occur at Gulgong, Vegetable Creek and Kiandra. Well-preserved relics of this life-period are brought to life from these buried river-beds, or ‘deep leads’ as they are called



Diprotodon Australis, RESTORED (ANGAS).

by the gold miners." In Post-Tertiary times the present surface drainage channels were formed. These streams have during recent and Pleistocene times covered up the Tertiary and Carboniferous formations of western New South Wales with deep alluvial deposits which now form the surface of the Great Plains. During Post-Tertiary times also the rivers cut through many of the deep leads above referred to, and carrying away their metallic treasures, have transported them to more accessible positions where they are worked at the present time. The *Pleistocene* period is represented by extensive gravel beds and the wide spreading plains of deep alluvium met with in Riverina and other portions of the western plains. During the Pleistocene period enormous animals such as the *Diprotodon* (a giant of the marsupial order, and as big as a rhinoceros or hippopotamus), the *Thylacoleo* (a marsupial lion), the *Thylacinus* (a pouched wolf-like animal), &c., roamed the forests, and their bones are now found in alluvial drifts in several localities, and in many of the bone-breccias of the limestone caves.

DEFINITIONS OF GEOLOGICAL TERMS.

BRECCIA, a rock composed of angular fragments united by a cementing material. CAINOZOIC is from Gr. *cainos*, recent, and *zoe*, life. CARBONIFEROUS, from L. *carbo*, coal; *fero*, I bear. (Note that coal seams are met with in sedimentary formations of every age, but the great coal seams of Great Britain belong to the *Carboniferous*, while those of New South Wales belong to the *Permo-Carboniferous* period). The CRETACEOUS system (L. *creta*, chalk) was so named because in England and Northern France its most conspicuous member is a thick bed of chalk. The Cretaceous rocks of New South Wales do not contain any chalk, but they contain fossils of the same geological age as the Cretaceous rocks of England, and a formation is always named according to the character of its fossils. CRINOIDS (Gr. *crinon*, a lily; *eidos*, a shape)=lily-shaped animals that once grew fixed to rocks on the ocean floor. DEVONIAN rocks were so named because they were first studied in detail in Devon, England. DIPROTODON (Gr. *dis*, twice; *protos*, first; *olous* gen. *odontos*, a tooth), so called because of the peculiar arrangement of its two front teeth. DOLERITE

=a coarse-grained basalt; from Gr. *doleros* deceptive (because it was easy to confound it with *diorite*, another igneous rock). **DYKE**=a wall of igneous rock forced up through other rocks and there cooled. **EOCENE** (Gr. *eos*, dawn; *cainos*, recent)=dawn of recent (life). A **FORMATION** is a group of rocks. **FOSSIL** (L. *fossus*, dug)=the remains or the traces of the remains of a once existing animal or vegetable, now found naturally embedded in rocks. **GLOSSOPTERIS**=a fern with tongue-shaped leaves (Gr. *glossa*, a tongue; *pteris* a fern). **JURASSIC** rocks are so named because they are extensively developed in the *Jura Mountains*, in France. **MESOZOIC** is from Gr. *mesos*, middle, and *zoe*, life. **MIOCENE** (Gr. *meion* less)=less recent. **PALAEOZOIC ROCKS** (Gr. *palaaios*, old; *zoe*, life) are so called because they contain the earliest record of plant and animal life. **PERMIAN**, from *Perm*, a province of Russia, where rocks of this age are well developed. **PLIOCENE** (Gr. *pleion*, more. **PLEISTOCENE** (Gr. *pleistos*, most). **SILURIAN**, from the *Silures*, an old English tribe, who lived on the borders of England and Wales, where these rocks are developed (Note that *Cambrian Rocks*, which are older than *Silurian*, do not occur, as far as is known, in New South Wales, but they are found in South Australia, North-western Australia, Victoria, and Tasmania). **TERTIARY**, from L. *tertius*, third. **THYLACOLEO** (Gr. *thylacos*, a pouch; *leon*, a lion). **TRIASSIC** (Gr. *trias*, a group of three) has reference to the division of these rocks into three distinct groups by German geologists. **TUFF** (It. *tufo*, soft stone) is a friable rock consisting of consolidated volcanic material (stones, scoriæ, dust, &c.)

METALS AND MINERALS.

New South Wales is the richest of the Australian States in mineral wealth, and it was owing to the discovery of its valuable gold fields in 1851 that the importance and possible future greatness of Australia were first brought prominently before the nations of the world. Gold, silver, copper, tin, iron and many other metals are found in abundance, while the coal fields of the State are both extensive and productive. New South Wales possesses in the gold and copper mining field of Cobar, and the silver mines at Broken Hill, some of the richest deposits of their kind in the world; while at the White Cliffs mine, in the Wilcannia district, occurs some of the finest opal ever

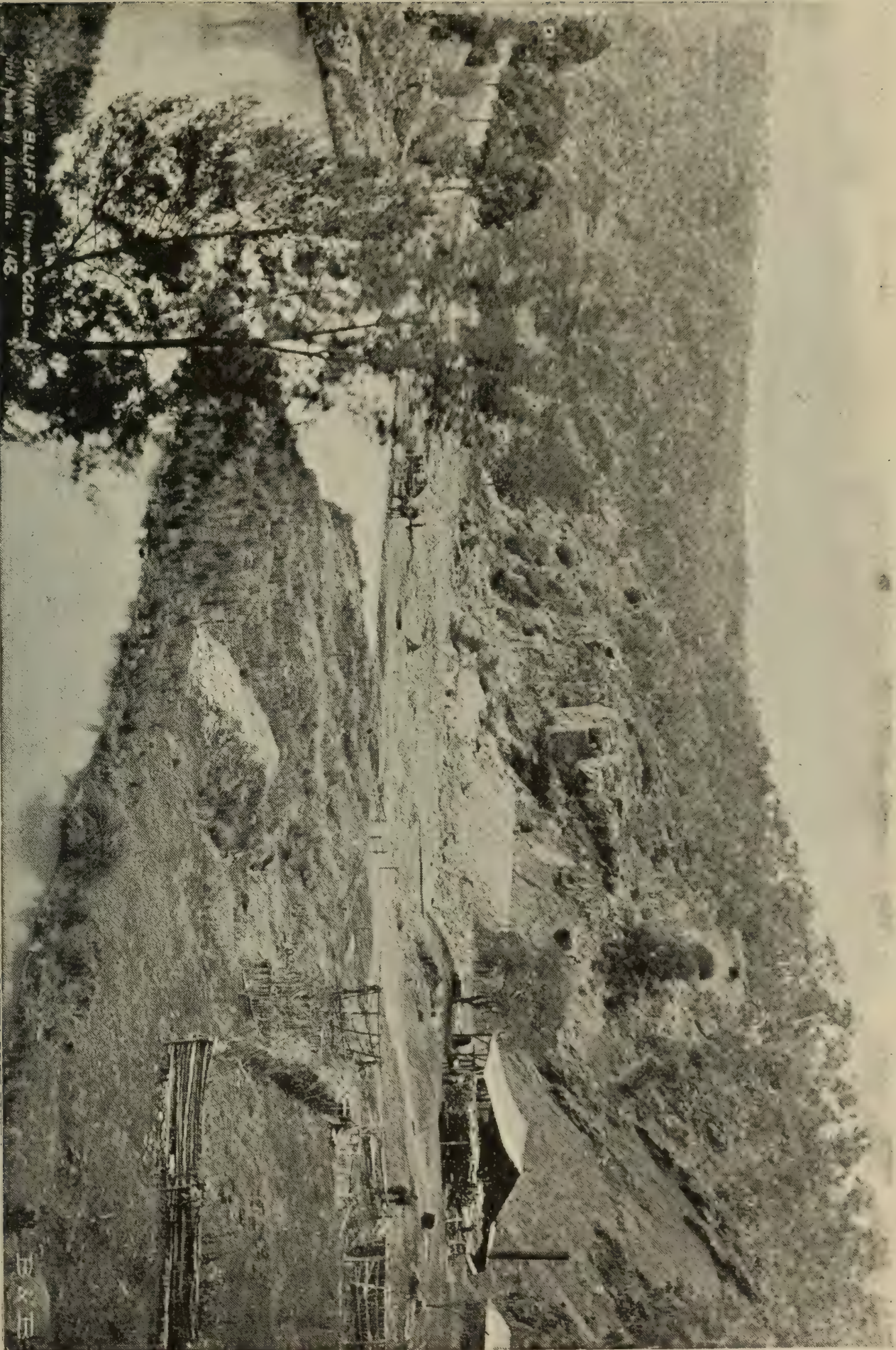
discovered. Nearly 40,000 persons are employed in and about the mines of New South Wales.

Gold-mining as an industry dates from Hargraves' discoveries at the Summer Hill and Lewis Ponds Creeks, in the Bathurst district, in 1851. The existence of gold in the State, however, was known much earlier. As far back as 1823 a surveyor named McBrien discovered gold-bearing sand in the hills between Tarana and O'Connell during his survey of the Fish River. In 1839 Count Strzelecki found auriferous pyrites, and in 1841 the Rev. W. B. Clarke discovered gold in the granite formation between Hartley and Hassan's Walls and at the head of the Winburndale Rivulet. He showed a sample to Sir George Gipps, but the latter, fearing the effect that proclamation of the discovery might have upon the convicts and colonists, said: "Put it away, Mr. Clarke, or we shall all have our throats cut."

The chief districts in the State where gold-mining is at present carried on are:—Cobar, Gundagai, Araluen, Adelong, Wellington, Hillgrove, Wyalong, Peak Hill and Murrumburrah; of these, Araluen is the leading centre of gold-dredging operations. In addition to batteries, most of the large gold fields now possess extensive chlorinating and cyaniding works, while the elaborate smelting works at Port Kembla (in the Illawarra district) and Cockle Creek (near Newcastle), have given a marked impetus to the industry generally. During the past decade New South Wales has yielded gold to the value of a million and a quarter sterling.

Silver, Lead and Zinc.—The great bulk of the silver is obtained from Broken Hill, where the metal was first discovered in 1883 by a boundary rider on the Mount Gipps Run. This field is now the principal silver and lead producing centre in the world. The ore deposits occur in lodes (of the type known as "Saddle Reefs"); traversing rocks of Silurian age. Copper, zinc, lead and gold also occur in the field, and the yearly value of the mineral output of the district exceeds three millions sterling. Next after Broken Hill the most important silver-lead area in the State is the Yerranderie field in the Burragorang Valley, and 40 miles

Copyright Photo.



OPHIR BLUFF (where GOLD was first found in Australia. 143.

F&H

OPHIR BLUFF—SUMMER HILL CREEK.
Where Hargraves discovered gold in 1851.

Kerry, Sydney.

by road from Picton on the great southern railway. Silver is also raised in the Cobar, Cootamundra and Bathurst districts, and at a few places on the Northern tableland. Other silver-producing districts are Captain's Flat, White Rock (near Drake) and some other places on the New England tableland. The silver ore at Captain's Flat contains gold, copper and lead, the last-named in considerable quantities.

Tin.—Although the Rev. W. B. Clarke drew attention to the existence of tin in New South Wales as far back as 1853, no attempt was made to work our tin fields till 1872. From that date to the end of 1910 the total value of the tin produced exceeded eight millions sterling. The industry is at present confined solely to the Northern tableland, the chief tin-producing centres being Ennerville, Tingha, Inverell, Glen Innes, Deepwater, Wilson's Downfall and the upper valley of the Macleay. Much of the tin raised is *stream tin*, derived by dredging from the Tertiary and Quaternary drifts, where these are composed of detritus from stanniferous granite. The tin-bearing alluvial deposits of New South Wales are being steadily depleted, and unless fresh fields are discovered and opened up, the tin yield will be much reduced. At present, the annual output of New South Wales is valued at nearly at quarter of a million sterling.

Copper.—The chief deposits of copper are found in the districts lying between the Macquarie, Bogan and Darling Rivers. The Great Cobar Mine is the largest in New South Wales, and in 1910, yielded smelted copper to the value of £280,000. This metal is also obtained in payable quantities at Cangai, in the Grafton district, at Adaminaby, at Canbelego and in the Blayney district.

The Broken Hill Proprietary Company save, in connection with their silver-mining operations, copper to the value of nearly £30,000 annually. Up to the end of 1910, copper to the value of over £10,000,000 sterling has been raised in New South Wales. The copper now turned out



Photo. by Rev. J. Milne Curran.

GOLD CRADLING AT TUMBERUMBA.

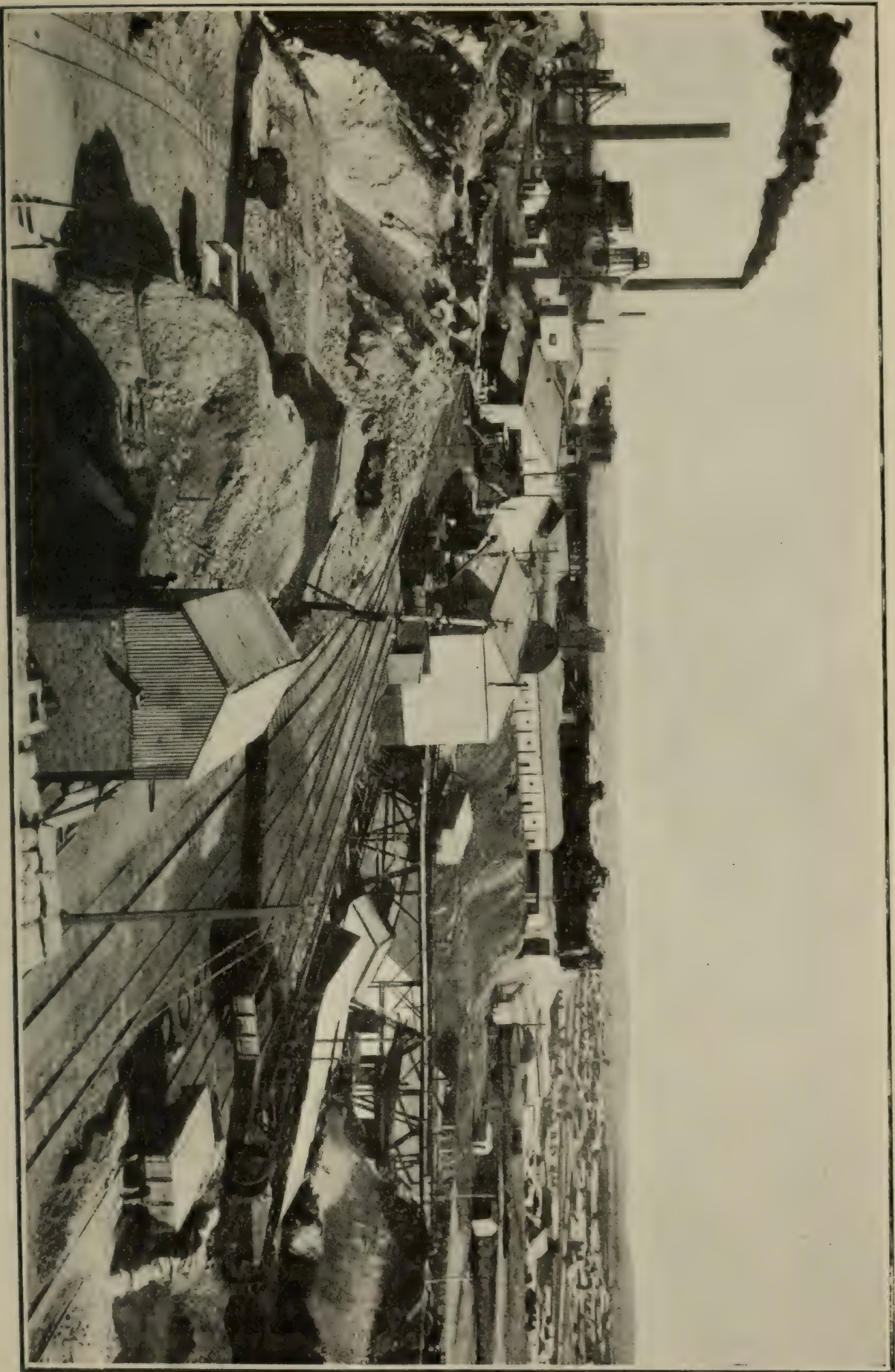
every year in large quantities by the Electrolytic Refining and Smelting Works at Port Kembla has established a wide reputation in the European market for its purity. The value of the gold, silver and copper treated at these works amounts to over a million pounds sterling annually.

Iron.—Iron is widely distributed throughout New South Wales. Deposits occur at Carcoar, Cadia, Lithgow, Mittagong, in the Rylstone, Mudgee and Illawarra districts, and at Port Macquarie and Port Stephens. The value of these deposits is greatly enhanced by their invariable proximity to beds of coal and limestone, and the districts indicated are traversed by railways. The Fitzroy Works at Mittagong have been shut down for some years past, and at present the only important iron works in the State are at Eskbank, in the Lithgow Valley. Here blast furnaces, foundries, and rolling mills are in operation, and large quantities of pig-iron from New South Wales are turned out every year. In addition, there is a large output of steel rails. Most of the plant at Eskbank was made on the ground, where fortunately iron ore, coal, fireclay and moulder's sand are present in abundance, while at Portland (on the Mudgee railway line) not many miles distant, there is an unfailing supply of limestone.

The ironstone beds at Cadia are the most extensive deposits in the State. They are within 14 miles of Orange, and are distant a little over 10 miles from the Millthorpe Railway Station. A competent geological surveyor writes as follows concerning the Cadia iron deposits:—

“A large proportion of this ore is of Bessemer quality, *i.e.*, could be used for providing steel by the cheaper acid processes. There is in sight a large quantity—at least one million tons—of oxidised ore which, as regards quality, will compare favourably with the Lake Superior and other American high-grade ores.”

The Carcoar deposits occurs at Coombing Park, two or three miles from the town of Carcoar. The geologist who first directed attention to these beds in 1851, wrote as follows:—“In the great park at Coombing the summits of



BROKEN HILL SILVER MINES.

five small mountains, or hummocks (of from 20 to 50 or more acres each) are composed of a very rich compact hematite iron, much of it magnetic. . . . The apparent quantity of iron is so immense, and if all things else were compatible with manufacture of iron, there is sufficient to supply another Sheffield for ages to come."

The iron ore deposits of the Mittagong and Berrima districts consists of brown hematite, limonite and bog iron ore. These ores appear to have been formed from ferruginous springs, some of which are still flowing in the vicinity, and depositing hydrous oxide of iron on the surface. It has been estimated that the quantity of ore in sight in this district is about 2,870,000 tons, yielding on analysis nearly 50 per cent. of metallic iron. Chromic iron deposits have been found at Gundagai, Nundle and Bingara. The Lithgow Ironworks obtains most of its iron ores from the Cadia, Carcoar, Mudgee and Rylstone mines.

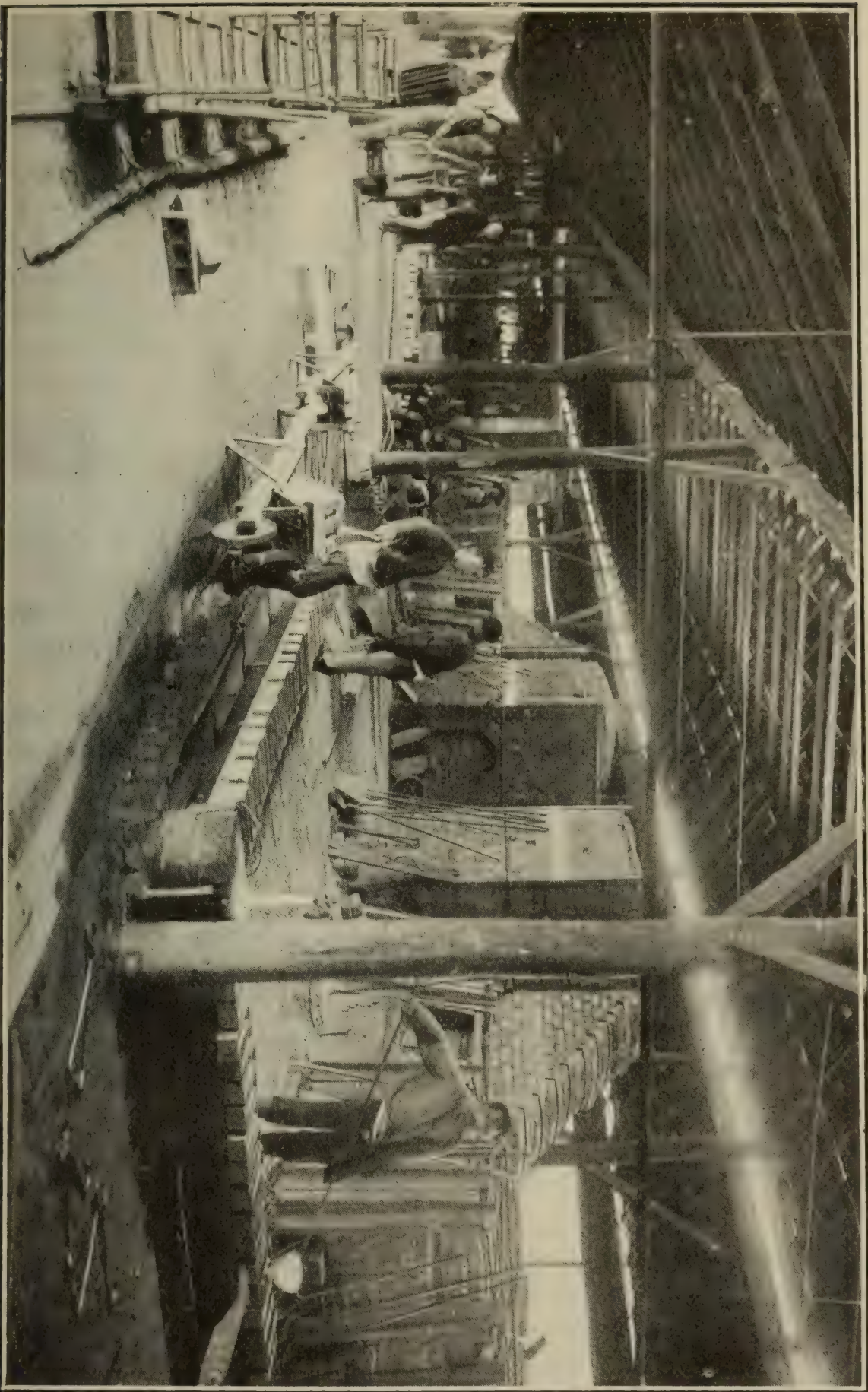
Antimony.—The chief seat of the antimony industry is at Hillgrove, near Armidale, where the ore is also worked for gold. Antimony ore is also found in the Gulgong, Rylstone, Bellinger and Macleay districts. The ore consists mostly of sulphide of antimony (stibnite), but oxide of antimony occurs as well.

Bismuth ores have been worked at Kingsgate, near Glen Innes, and are known to occur in the Pambula, Broken Hill, Deepwater, Yass and Oberon districts. On account of the small demand for bismuth the deposits are only worked on a limited scale.

Platinum is produced at Fifield, in the Parkes district. In the Broken Hill district some copper lodes occur in which platinum is stated to have been found by assay. The metal, however, has never been seen by the naked eye in the ore from the Broken Hill lodes.

Mercury, in the form of cinnabar, has been obtained in the Cudegong River, near Rylstone, and at Copmanhurst, Woogoolga, Bingara, Solferino, Drake and Cooma, but none of these deposits have been extensively worked.

Scheelite is obtained at Hillgrove and Tuena, and



CASTING COPPER INGOTS—COBARR REFINERY, LITHGOW.

Wolfram occurs in the Deepwater, Glen Innes and Wagga districts. The annual value of the annual yield of each is about £15,000.

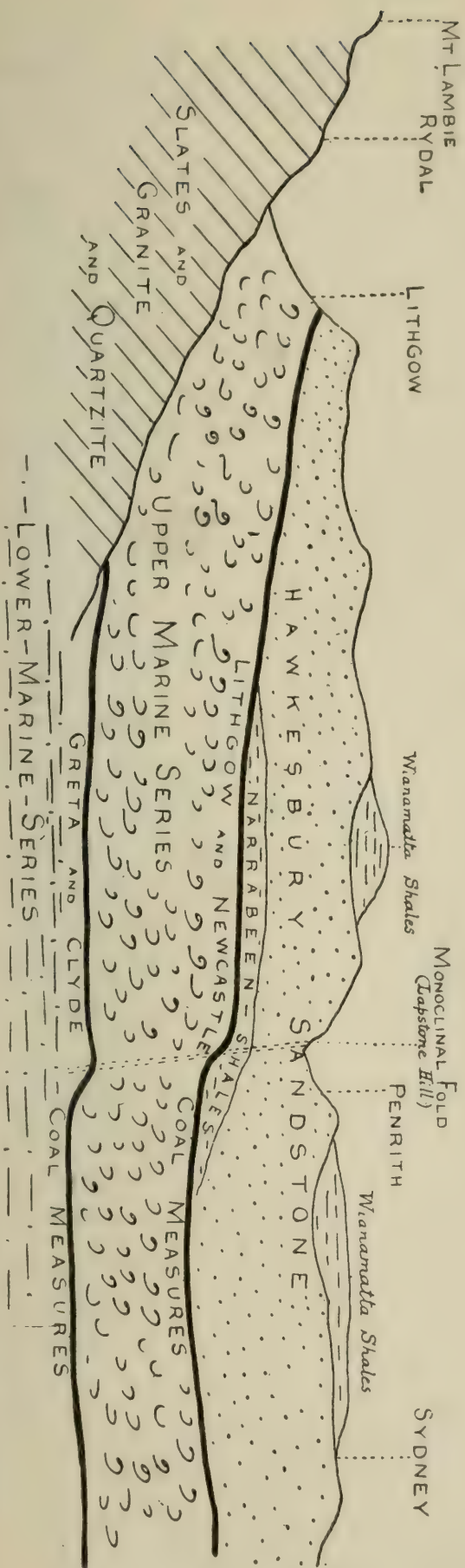
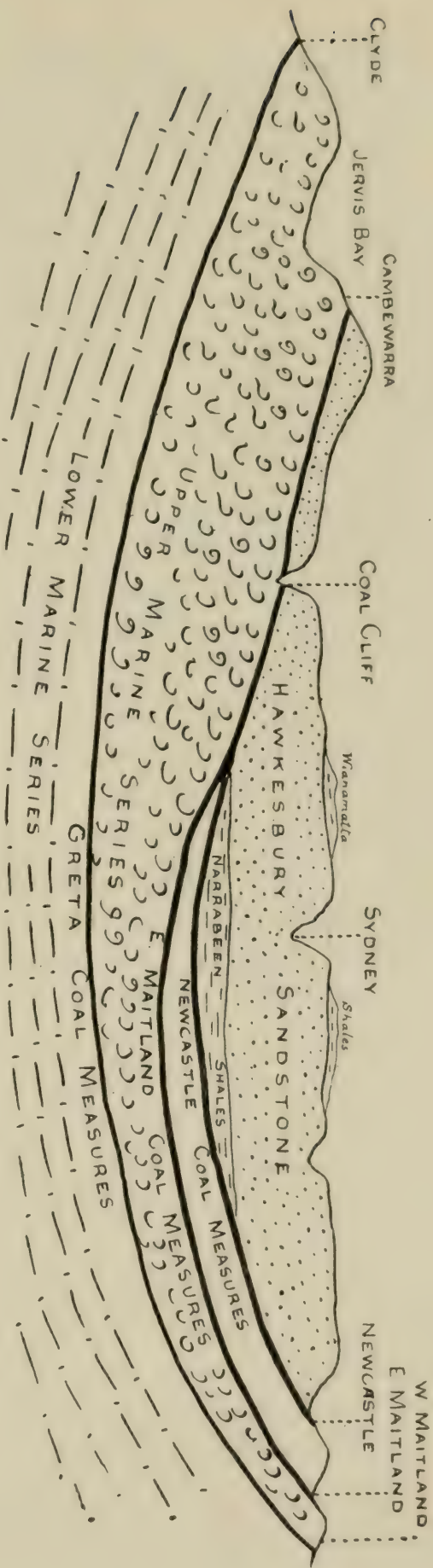
Marble deposits exist in the Marulan, Orange, Bathurst, Tamworth, Moonbi, Newbridge and Mudgee districts. It is quarried mainly at Borenore and Caloola.

Alum stone, yielding about 80 per cent. of alum, occurs as an immense deposit at Bulladelah, 35 miles from Port Stephens. The produce of this field is sent to England for treatment.

Opal.—Some of the best precious opal in the world is obtained at the White Cliffs, about 60 miles N.N.W. of Wilcannia, where it was accidentally discovered by a kangaroo hunter in 1889. The opal, some of which is valued at as much as £18 per oz., occurs in small pipes in a soft, white rock (locally known as "Angel Rock"). About 500 men find employment on the field, and the value of the annual output exceeds £60,000.

Diamonds occur at Bingara and Inverell in alluvial drifts, but they are small and for the most part faulty in colour. They have also been found at Two Mile Flat, near Mudgee. The State's largest diamond yield at present is that of Copeton, in the Tingha district. A few diamonds have lately been found at Pine Ridge, near Leadville. Some of the largest and clearest forms of *topaz* in the world have been found in the New England district, while *sapphires* are found in the Inverell, Emmaville and Tingha districts. In the drifts of the Wingecarribee River, near Berrima, the *sapphire*, *emerald*, and *amethyst* have been found. Gems, including the *diamond*, *sapphire*, *emerald*, *amethyst*, *garnet* and *zircon* have been met with in the gold and tin bearing drifts throughout the State. *Turquoise* occurs in Upper Silurian slates near Moruya.

Infusorial Earth occurs near Barraba, Lismore, Cooma and the Warrumbungle Mountains, and will no doubt be of value in the future for the manufacture of polishing powder. *Kaolin* of excellent quality (and said to be far superior to the best obtained in England or France) occurs



DIAGRAMS SHOWING IDENTITY OF THE NEWCASTLE, ILLAWARRA, AND LITHGOW COAL MEASURES.

NOTE.—The above are not drawn to scale—they are merely diagrammatic.

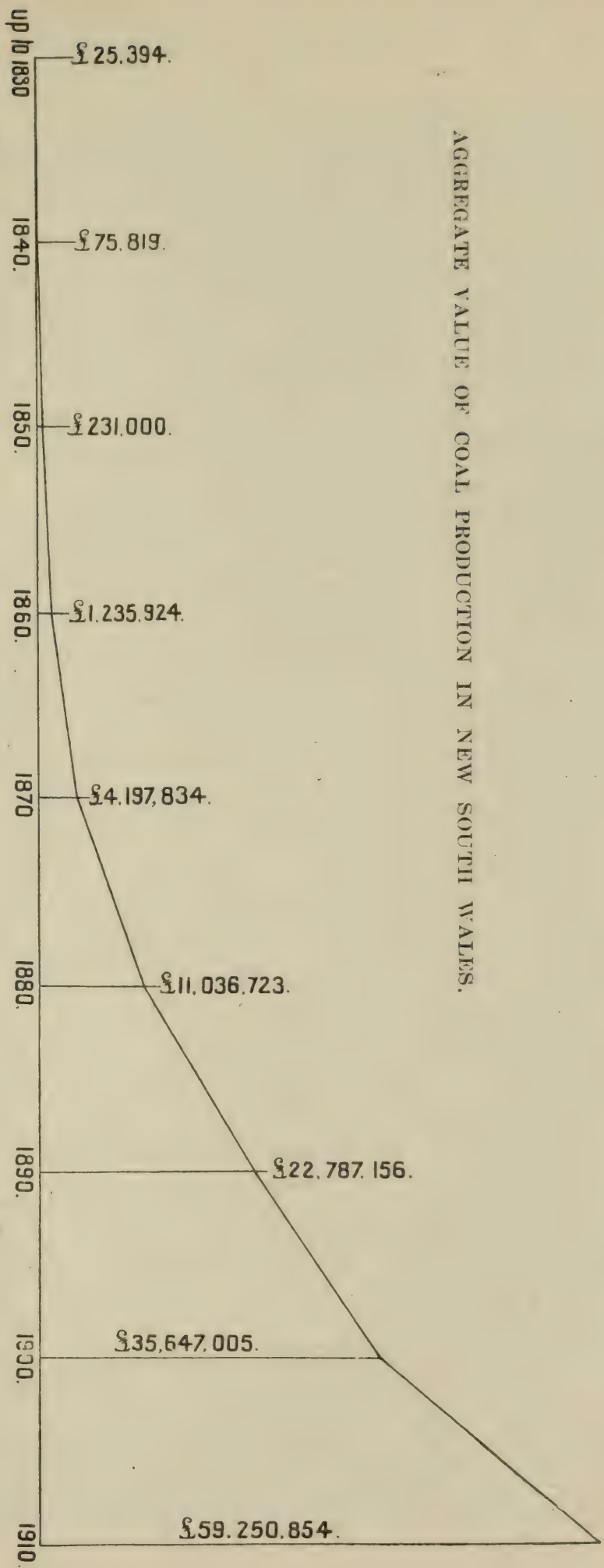
at Tichborne, near Parkes; while *yellow ochre* and other *pigment deposits* are met with near Dubbo and Mudgee, as well as in the Wellington district.

Granite occurs extensively throughout the State, and excellent blocks have been quarried at Moruya; *trachyte** is obtained at Bowral; and *basalt* or blue metal (used for road metalling and ballasting of the railway lines) at Kiama, Prospect, Pennant Hills and a score of other places, while *building stone* of excellent quality is furnished by the Hawkesbury Sandstone formation on which Sydney stands.

Coal.—The coal fields of New South Wales form one of the great factors of its national wealth, and occupy an area of at least 25,000 square miles, while their working gives employment to about 20,000 men. Coal was first discovered in the State in 1797 at Mount Keira, near Wollongong, by a man named Clark, supercargo of the *Sydney Cove*, while on his way to Sydney overland along the coast after the wreck of his vessel in Bass Strait. Later in the same year coal was discovered at the mouth of the Hunter by Lieutenant Shortland. This seam was worked under Government control by convict labour, until in 1826 the Australian Agricultural Company obtained a grant of a million acres of land, together with the sole right conferred by charter of working the coal seams which were then known to exist in the Newcastle district. As a result of this grant several mines were opened and profitably worked for several years, but it was not until the termination of the monopoly in 1847 that the coal mining industry began to be extensively developed. There are at present about 100 collieries at work in the State, and the chief coal fields are five in number: (1) the *Hunter River* or *Newcastle-Maitland*; (2) the *Southern* or *Illawarra*; (3) the *Western* or *Lithgow*; (4) the *South-Western* or *Mittagong*; and (5) the *Namoi* or *Gunnedah*. Coal is also worked at Berima and Bundanoon (on the Geat Southern Railway Line),

*The so-called “trachyte” of Bowral is in reality a rock composed of glassy felspar and hornblende, and should, therefore, be classed as a *syenite*.

AGGREGATE VALUE OF COAL PRODUCTION IN NEW SOUTH WALES.



2%	5%	11 1/2%	20%	21 1/2%	40%
1860.	1870.	1880	1890.	1900.	1910.

Percentage of Value of Total Coal Production during each decade up to end of 1910.

between Wallerawang and Rylstone on the Mudgee Railway, and in the Clarence River district. The Clarence River coal field (which, like the Ipswich coal measures in Queensland, is of Mesozoic age), is not worked very extensively owing to the presence throughout the coal seam of numerous partings and clay bands. Sydney is situated in the centre of the great coal-bearing basin that extends from Newcastle to beyond Jervis Bay. The existence of a coal seam beneath Sydney was proved by bores put down 3,000 feet deep at Cremorne Point, on the northern shores of the harbour. Huge shafts have been sunk to open up this seam at Balmain, the workings in connection with which extend under the Sydney Harbour and on towards North Sydney. The seams of coal at present worked occur in the *Upper Coal Measures* (e.g., Sydney-Newcastle series), *Middle Coal Measures* (e.g., East Maitland or Tomago series), and *Lower Coal Measures*, e.g., the Greta series). The Greta seam yields excellent "gas coal," and in the South Maitland field attains in places a thickness of 30 feet. From 1858 to 1910 over 160,000,000 tons of coal, valued at over £60,000,000, were raised in New South Wales.

Kerosene Shale.—Hartley, the Wolgan Valley, Caper-tee and Murrurundi are the chief seats of the kerosene shale mining industry. The annual output of kerosene shale from the Hartley and other mines of the Western district is about 50,000 tons, and up to the end of 1910 New South Wales has produced shale to the value of about two and a quarter million pounds sterling. These shale deposits occur in the Coal Measures. The Commonwealth Government pays a bounty on the manufacture of kerosene and paraffin drawn from Australian shales. Oil shale also occurs at Katoomba on the Blue Mountains and at Joadja Creek, near Mittagong.

ARTESIAN WATER.

Artesian water has contributed in a large degree to the formation of permanent settlement in many arid parts of the interior of New South Wales. Nearly 500 bores have

been drilled into the water-bearing rocks of the State, and of this number about 150 have been sunk by the Government to provide an adequate water supply for sheep and cattle travelling along the occupied stock routes, and also to acquire reliable evidence as to the limits and extent of the artesian water-bearing formation. The remaining 350 bores have been sunk by squatters for the use chiefly of the stock on their runs.

In connection with some of the Government bores experimental farms have been established to prove to the settlers on the plains the value of artesian water for irrigation purposes. That it is of immense value for the encouragement of plant life in arid districts is abundantly shown by the good results that have attended operations on the experimental farms, for example, at the Native Dog and Barrington Bores, where "Lucerne, maize, wheat, tobacco, millet, planter's friend, sugarcane, date palms, bananas and many other fruits and vegetables of a tropical and subtropical character" have been grown successfully in very unfavorable seasons.

In times of drought these farms around the artesian bores in the far west form a series of oases in the midst of a repelling wilderness. "Nothing more thoroughly desolate can be imagined," writes Mr. E. F. Pittman, "than the appearance of the western plains in a season of drought. For scores of miles there is an utter absence of vegetation, unless the sombre, stunted scrub, which occurs in belts at intervals, can be dignified by such a name; the only noticeable variation is from 'black soil' to 'red soil,' or, worse than either, to sandhill and claypan country. The scorching heat and ever recurring sensation of thirst are accentuated by the mocking *mirage*, whose phantom lakes elude all attempts to approach them. The traveller in this desert experiences a peculiar feeling of isolation and depression only to be compared to that of being alone at sea. What then must be the state of mind of the pastoralist as he rides his rounds on the estate? He has sunk all his capital in the vain endeavour to improve this inhospitable country, yet the only relief to the

dead level of the landscape is provided by the carcasses of his perished stock which dot the plain, and but serve to remind him of his constantly increasing losses. However, thanks to the efforts which resulted in the discovery of the priceless store of under-ground water, the outlook is now much more promising in many districts where the rainfall is both scanty and uncertain."

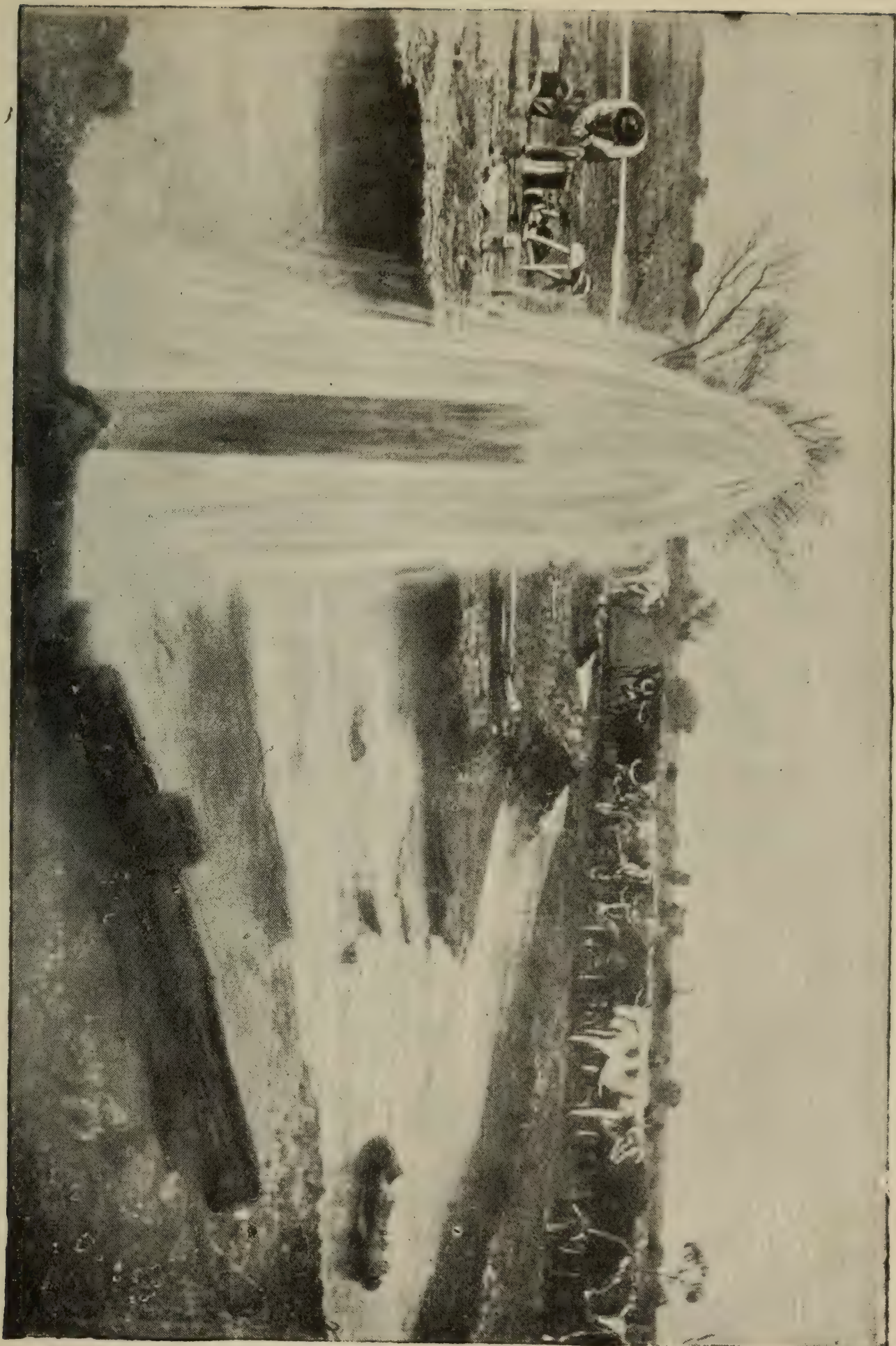
The artesian water-bearing area of New South Wales occupies practically the whole of the north-eastern section of the Great Plains and the western flanks of the tablelands contiguous thereto. It forms part of the Australian Artesian Basin, which covers an area of 569,000 square miles and occupies (i.) more than half of Queensland, taking in practically all of that State lying west of the Great Dividing Range with the exception of the extreme north western area, (ii.) 83,000 square miles in New South Wales, and (iii.) about 110,000 square miles in South Australia.

The southern boundary line of the artesian area in New South Wales stretches, roughly, from Milparinka to White Cliffs, thence to Bourke. From Bourke it passes round the Northern end of Narren Lake to Coolabah, then to Nyngan, Warren, Gilgandra, north of Baradine, to Narrabri and Warialda, and thence north into Queensland. All of this water-bearing area is dotted over with bores, very many of which exceed 3,000 feet in depth, and about 30 of them yield over a million gallons a day each. Most of the bores of very high yield are met with in the Moree, Walgett and Coonamble districts.

The artesian water supplies of the basin as a whole are derived from the rainfall along the western flanks of the tablelands in Queensland and in northern New South Wales. The water-bearing group of rocks is half-basin shaped, and the upturned porous intake beds occur along the eastern and north-eastern sides of the basin only, while the remaining beds of the formation are hidden under the deposits composing the plains of the interior. The intake beds about Coonabarabran cover an area of 8,400 square miles, while the intake north-west and south of Warialda cover 1,600.

Photo. by Rev. J. Milne Curran.

ARTESIAN BORE—WESTERN NEW SOUTH WALES.



square miles of country. The Warrumbungle Ranges form portion of the intake region.

The rain water, after entering the porous intake beds, works its way down along the strata; and it is supposed that the basin has outlets towards the Gulf of Carpentaria on the north, and towards the Great Australian Bight and Lake Eyre on the south. In the three States of Queensland, New South Wales and South Australia there are no less than 1,600 bores tapping the artesian water-bearing beds. These beds belong to both the Cretaceous and the Triassic ages of the world's geological history.

Bore water is, as a rule, deeply impregnated with saline substances of different kinds (*e.g.*, carbonate of soda, sulphate of magnesia or Epsom salts, common table salt, etc.), and its temperature is, as a rule, very high. The salts in solution are derived from the beds through which the water flows underground, while the high temperature is due to the very great depth from which the water rises. The Zetz-Spa, so much used as a mineral water in New South Wales, comes from the mineral spring at Ballimore, near Dubbo.

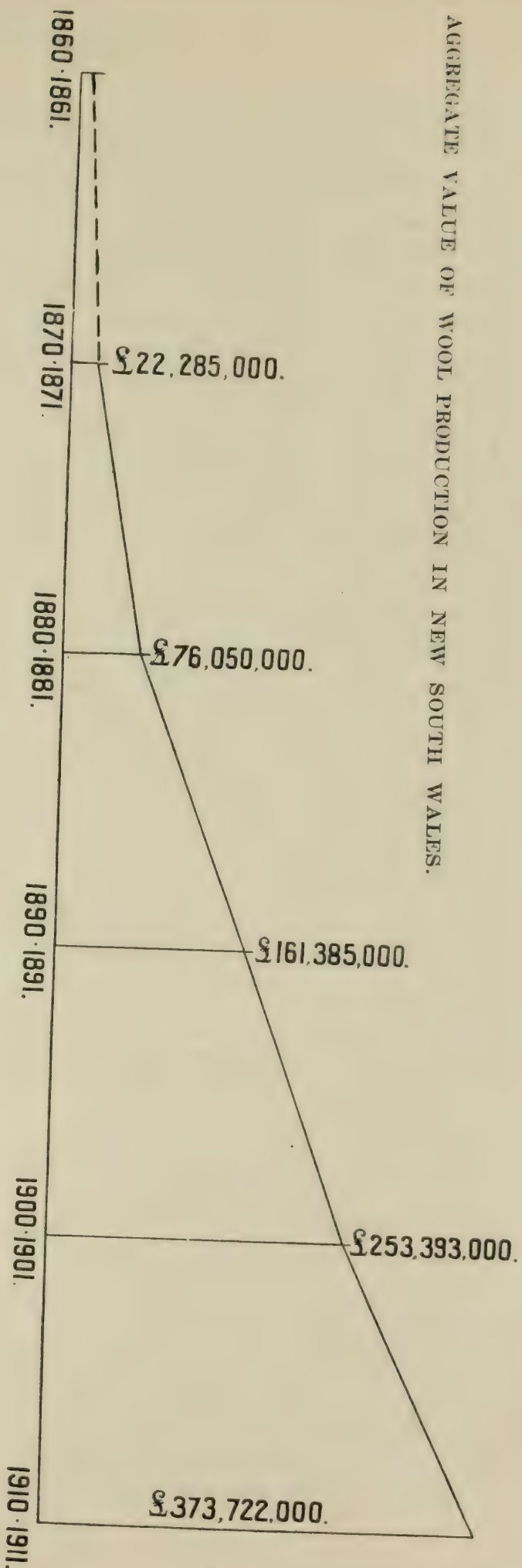
The daily flow from the artesian bores of New South Wales exceeds 116,000,000 gallons. The two deepest wells in the State are those at Booringa (depth 4,341 feet, and a daily flow of 1,062,000 gallons), and Dalgetty (depth 4,086 feet, and a daily flow of 637,000 gallons). Both of these wells are in the Moree district. The highest temperature observed in any of our artesian water bores was 140° F., and the lowest 71° F. Artesian boring in New South Wales dates from 1879, when Mr. David Brown, a squatter, completed a successful bore on the Killara Station, near Bourke.

INDUSTRIES.

In addition to mining, the chief industries of New South Wales are the *pastoral industry, agriculture, dairy-farming, fruit-growing, timber-getting and fisheries.*

Sheep-farming is confined mainly to the tablelands and the western plains. As an industry, it dates back to very

AGGREGATE VALUE OF WOOL PRODUCTION IN NEW SOUTH WALES.



1861.	1870.	1880.	1890.	1900.	1910.
6%	14 1/4%	23%	24 1/2%	32 1/4%	

Percentage of Value of Total Wool Production for each decade from 1860 to 1910.

early times in the history of British settlement in Australia, and to-day New South Wales fine wool commands a very high price in the British and European markets. Our sheep flocks now number 46 millions—about as many as are pastured in the rest of the States of the Commonwealth taken together. During the wool season the harbours of Sydney and Newcastle are thronged with large steamers and sailing ships engaged in transporting the wool-clip of the State to our over-sea customers—Great Britain, France, Germany, the United States of America, Japan, and Italy. The annual wool-clip of New South Wales amounts to about 380,000,000 lbs., and of this amount only one million lbs. are used up by the local woollen mills. It has been estimated that about 85 per cent. of the wool grown in New South Wales is disposed of at the annual wool sales held in Sydney, where buyers from England, America, Germany, and France vie with one another in endeavouring to secure supplies for their respective firms over-seas. In addition to wool, a large export trade is carried on from Sydney and Newcastle in frozen mutton, sheepskins, tallow, and other pastoral products.

Cattle breeding is largely carried on, the main object being the production of stock suitable for slaughtering, and the raising of profitable dairy herds. The number of cattle in the State exceeds three millions, and during the five years preceding 1910 New South Wales exported over a million lbs. of frozen beef.

Horse breeding occupies an important place in New South Wales industrial life, the State possessing at present over 600,000 horses. In addition to their use for draught and carriage purposes in the State, large numbers are exported annually for army purposes to India, where "Walers" have a high reputation for all-round serviceableness.

Australian *agriculture* had its origin in the endeavours of the first colonists to stave off starvation. Soon after Governor Philip landed in 1788, he selected the shores of

what is now called Farm Cove for the first Government farm. To-day the site is occupied by the Sydney Botanic Gardens, one of the most beautifully situated public pleasure resorts in the world. Failing to obtain any satisfactory results from the land about Sydney, another Government farm was attempted at Rose Hill, Parramatta.

In 1790, James Ruse, the first private settler, it is said, to engage in agriculture in New South Wales, began operations at Parramatta and was successful. It is doubtless the success of Ruse which induced the Governor to try the land in that neighbourhood. The following account of this man's work is given by one of the early military officers, Captain Tench: "I next visited a humble adventurer who is trying his fortune here. When his term of imprisonment expired in August, 1789, he claimed his freedom, and was permitted by the Governor, on promising to settle in the country, to take, in December following, an uncleared piece of land, with an assurance that if he would cultivate it, it should not be taken from him. Some assistance was given him to fell the timber, and accordingly he began. His present account to me was as follows: 'I was bred a husbandman near Launceston in Cornwall. I cleared my land as well as I could with the help afforded me. The exact limit of what ground I am to have I do not yet know; but a certain direction has been pointed out to me in which I may proceed as fast as I can cultivate. I have now an acre and a half in bearded wheat, half an acre in maize, and a small kitchen garden.'"

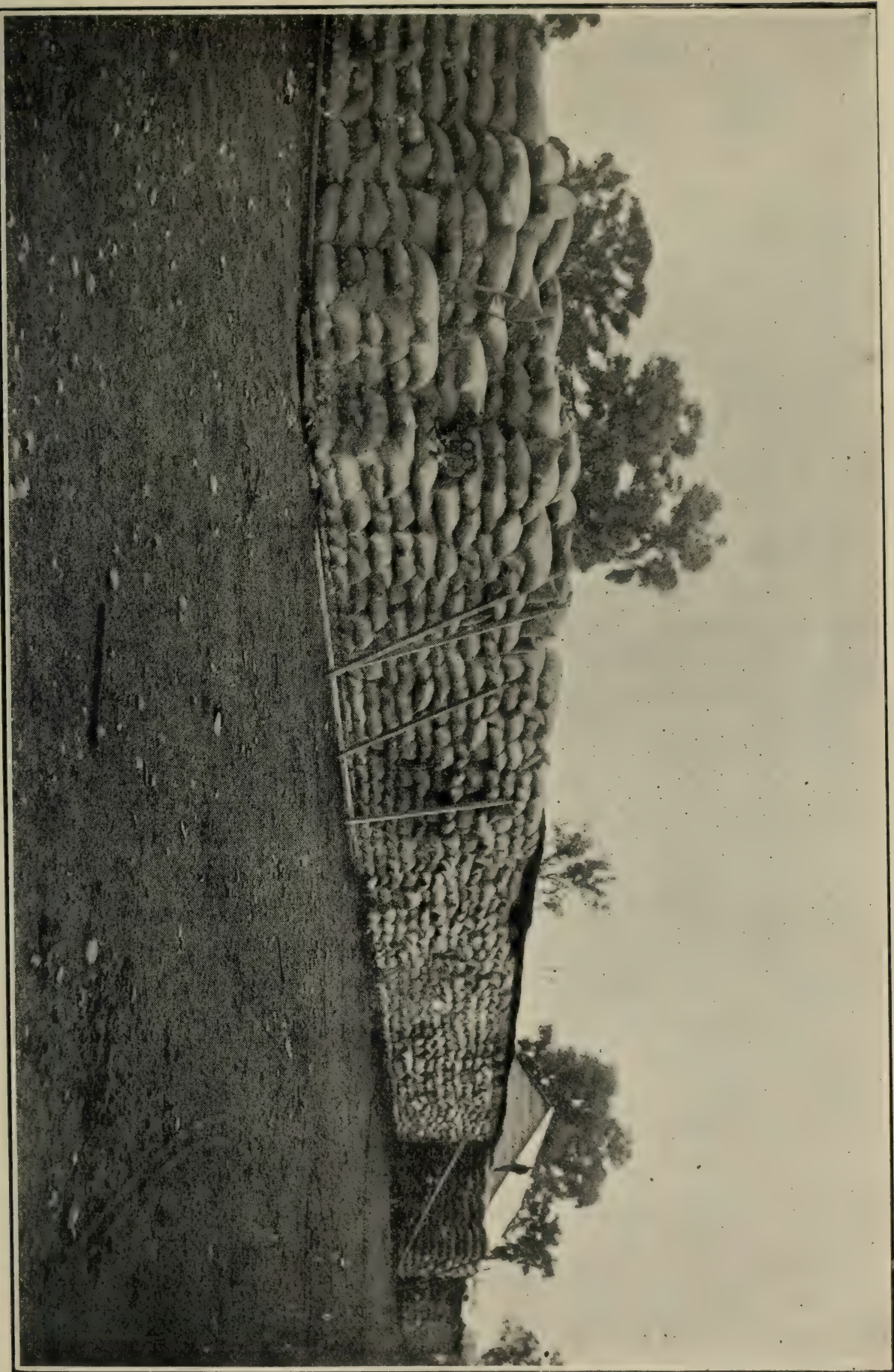
From these small beginnings the great agricultural industry of New South Wales has grown to its present huge dimensions.

It is only during the last two decades that New South Wales has achieved marked prominence as an agricultural country. It was only in 1897, for instance, that the wheat production of the State exceeded the local consumption, and that export was possible. Since then the wheat yield—except in the drought years of 1901-2—has continued to make great strides and now the annual yield is 28,000,000

bushels. The area under wheat is 2,000,000 acres, while it is estimated that within the State there are at least 20,000,000 acres of land suitable for wheat growing. A similar story of progress can be told with regard to the rest of the State's agricultural products, so that with a vast field for expansion, with highly favourable climatic conditions, with illimitable markets brought to our very doors by swift modern steamships, and low freights, New South Wales must, within a very few years, become one of the greatest agricultural countries of the world.

By far the largest part of the area under crops is devoted to the cultivation of wheat, which can be produced more cheaply in New South Wales than in any other country in the world. The wheat belt includes large areas on both tablelands, and is gradually working westward far into the plains, where at one time it was thought that wheat could not be profitably grown except in places where the annual rainfall amounted to at least 20 inches. Now-a-days wheat is extensively and profitably grown in districts where the annual rainfall is as low as nine or ten inches, provided that rains occur at the proper time of the year, and that the soil has been so worked as to be in a fit state to receive the full benefit of the fall. The western boundary of the profitable wheat-growing belt extends roughly from Bengalla on the Dumaresq, thence in a line through Moree, west of Wee Waa and Pilliga, east of Coonamble, through Gilgandra, Trangie, Dandaloo, Trundle, Ungarie, Barellan, Narrandera, Wangonilla to Swan Hill on the Murray.

In connection with this great industry, the name of Australia's foremost wheat breeder—the late William James Farrer—stands out pre-eminently. “We owe to his labours,” writes Mr. F. B. Guthrie, “that we can produce whole fields of wheat where none grew before; that we can make it grow successfully in places where it had been tried before and found to be unsuitable; that we possess varieties which resist drought and escape diseases better than the old varieties, and at the same time possess higher value



WHEAT STACK IN A COUNTRY RAILWAY YARD.

as milling wheat, and produce flour of better quality than did these."

"Farrer was born in England in 1845, and was to have been educated for the Bar; but he preferred medicine, and took up that branch at Cambridge. A lung trouble, however, forced him to abandon his studies, and he sailed for Australia about 1870. His idea was to take up a sheep station, but want of funds drove him to surveying. Seven years later he retired and settled down near Queanbeyan, New South Wales, and it was in these leisure days that he first made a hobby of wheat experimenting. Within two years he had accomplished so much that was of value, that the then Minister for Agriculture in New South Wales engaged him permanently as Wheat Experimentalist, a position he held till his death in 1906.

"By judicious cross-breeding and selecting, he succeeded in investing a given variety with any one or more of the score of variable characteristics which make wheat valuable as a crop. Thus he was able to improve the colour, size and shape of the grain; to impart the quality of holding its grain well to a variety which was so liable to shell as to make harvesting difficult; to stiffen the straw of another which was liable to become beaten down by wind or rain; and in a multitude of ways to improve the crop in view of the local vicissitudes which it would have to encounter.

"Farrer's supreme merit, wherein he has been able to achieved results not hitherto obtained by any other wheat breeder, lies in the fact that he kept steadfastly before him the importance of producing none but wheats of the very best milling quality; that, whilst he tried for certain definite characteristics such as prolificness, rust-resistance, drought-resistance, &c., he saw to it that no new variety left his hands unless it was a wheat acceptable to the miller and yielding a flour of good baking quality.

"The result is a distinct improvement each year in the nature of the locally grown grain; and when Australia comes to fulfil her destiny as one of the great wheat-exporting countries of the world, it will be our own fault if we

are not in a position to export only the best of wheat, and Australian wheat should have the same high reputation as is now enjoyed by Australian wool."

Of the crops other than wheat, *maize* ranks next in importance. Its cultivation is confined mainly to the low-lying flats flanking the coastal rivers. The great profits to be made from dairying on the land that is suited for maize-growing, has led during recent years to the comparative neglect of this cereal. Maize forms the most important food for pigs, and since pig-raising and bacon-curing as adjuncts to dairy-farming are largely carried on in many parts of the coast, the cultivation of maize must hold an important place in New South Wales agriculture.

Oats and *barley* are grown on the tablelands, but not in great quantities, despite the fact that both soil and climate are suitable for their cultivation.

Lucerne is grown extensively on the river flats of the Hunter and Manning districts and in many places on the tablelands. In favourable districts it grows so rapidly that as many as eight crops a year have been reaped, each averaging about one ton per acre.

Lucerne is also grown in the far western pastoral districts under irrigation. "As many as 75 sheep per acre were fed for four or five months during the dry season with lucerne grown on land irrigated with water from the Lachlan River while at its lowest level."

Brown millet and *sorghum* are largely grown in the Hunter River Valley and along many of the northern coastal rivers, while the cultivation of sugar cane is now mainly confined to the Tweed River district, and to a smaller extent along the Lower Clarence.

In order to promote agricultural education, the Government has established in various parts of the State *Experimental Farms*. The work at these institutions aims, in the main, at (i.) Determining the most suitable economic plants to grow in the particular district in which the farms are situated, and at (ii.) demonstrating how best to produce and to harvest crops in the most suitable and economic

manner whenever exhaustive experiments have determined the kinds likely to prove profitable. At the Wagga farm extensive experiments have been made in the breeding of various kinds of wheat, in the growing and handling of fruit, and in the breeding of sheep. The Bathurst farm comprises 700 acres where numerous important experiments have been made in connection with cereals, fodders, fruit-trees, sheep and cattle, and the rotation of crops. This farm has had a vast influence on the local farmers in consequence of the demonstrations given of the great increase of its crops over all other crops in the district. There is abundant ground too for hoping that the well-managed Experimental Farm at Yanco will exercise a salutary influence in directing aright the energies of the thousands of settlers who, in the near future, may reasonably be expected to be in occupation of the farm lands of the Murrumbidgee Northern Irrigation Area.

On the road from Lismore to Ballina in the Richmond River district, is the Wollongbar Experimental Farm. It is in the midst of one of the finest dairying districts in Australia. Here experiments are carried out in the cultivation of sisal hemp, ramie fibre, wattles, grasses and other fodders, sugar, tropical fruits, and various other economic plants. The students are also trained in the handling of dairy cattle and pigs.

Experimental work of a like character is carried out at the Grafton and Glen Innes Farms, while students are taken at the Berry Experimental Farm, for courses of dairying instruction in cheese making, butter making, and the breeding of dairy stock.

Valuable as is the work carried out at the various district experimental farms, nevertheless, the institution which has had the most influence in promoting scientific agriculture throughout the State is the splendidly-equipped and admirably-conducted *Hawkesbury Agricultural College*, close to Richmond.

“The farm equipment of this college is ample and of the most modern type, and students have every opportunity



HAWKESBURY AGRICULTURAL COLLEGE.

of making themselves proficient in various branches of agriculture and horticulture. The dairy is well stocked with suitable breeds of dairy cattle and pigs. The orchard gives an opportunity of acquiring a thorough knowledge of all branches of orchard work, the drying and canning of fruits, the making of preserves, of tree planting, pruning, grafting, budding and manuring. Instruction is also given in various branches of gardening, in poultry rearing, in bee keeping, in carpentry and building, in blacksmithing, engine-driving, and in the use of electricity. In the class rooms instruction in chemistry, botany and bacteriology and their practical application, in veterinary science and wool-sorting, in the use of the microscope and in book-keeping, is given. The course extends over two years, and each student must be over the age of 16 years."

As an indication of the immensely important place that farming is destined to take in Australian industrial life, the University of Sydney has established a Department of Agriculture, where advanced students may receive the highest possible scientific training in the principles and practice of all classes of agricultural processes.

Dairy Farming is now one of the staple industries of the State, and perhaps in no other branch of our industrial life has there been greater activity and progress during the last two decades, since research has brought to the aid of the dairyman the separator, the refrigerator, and in general the most modern and scientific methods of handling.

From very early times in the history of New South Wales, Illawarra and the rest of the coastal strip further south have been noted for their butter, and even now it is upon the South Coast as far as the Shoalhaven that the metropolis relies in the main for its daily supply of milk. But during comparatively recent times the North Coast district—Richmond and Tweed chiefly—has bounded into the front rank as regards output of butter and other dairy products, the old-time tangled brushes of these parts having been cut down and replaced by smiling fields of

paspalum, of which thousands of cattle may be seen peacefully grazing.

Dairying is now extensively carried on throughout the coast district, on both tablelands, and in many places in the eastern portions of the interior plains. The State possesses over three million head of cattle, three quarters of a million of which are dairy cows, and its yearly produce of butter is 83,000,000 lbs., and of cheese over 5,000,000 lbs.

The State Agricultural Department exercises considerable supervision in connection with the dairying industry. Dairy experts are employed to give instruction to farmers in approved methods of production, to examine animals, and to inspect the buildings used for milking and separating. The State laws, too, are stringent as to cleanliness of the dairying premises, milking utensils, etc., while purity of the product to be placed on the market is rigidly insisted upon.

In order to maintain the purity and quality of Australian butter the Commonwealth regulations and the Commerce Act of 1905 provide that butter intended for shipment oversea has to be covered with a true trade description, and that at least the following matter should appear in the brand: The word "Australia;" the name of the State in which it was produced; nett. weight; manufacturer's or exporter's name or registered brand; and the words "pure creamery butter," "pastry butter," "milk butter," or "re-packed butter," as the case may require. Other matter may be added, but it must be true, and not liable to mislead the purchaser.

By these means purity and quality are guaranteed, and trade is also facilitated, since quantities of butter are purchased by merchants solely on the certificate issued, without even being seen.

In many places away from the coast dairying is carried on in conjunction with sheep farming or wheat growing, sufficient fodder being grown to carry the cattle through the winter months. In this way local wants are met.

Cream separation and butter making are often carried on together under the co-operative system. The erection of large central butter factories, equipped with the refrigerators and other improved appliances, and supplied by numerous separating establishments and "creameries" has resulted in a considerable reduction in cost of manufacturing butter, while the butter produced is of a more uniform quality. The number of dairy farmers who still adhere to the old hand processes in making butter is now steadily diminishing.

"The best New South Wales factories," writes our chief dairy expert, "now turn out a butter very little, if anything, below the best made in any part of the world."

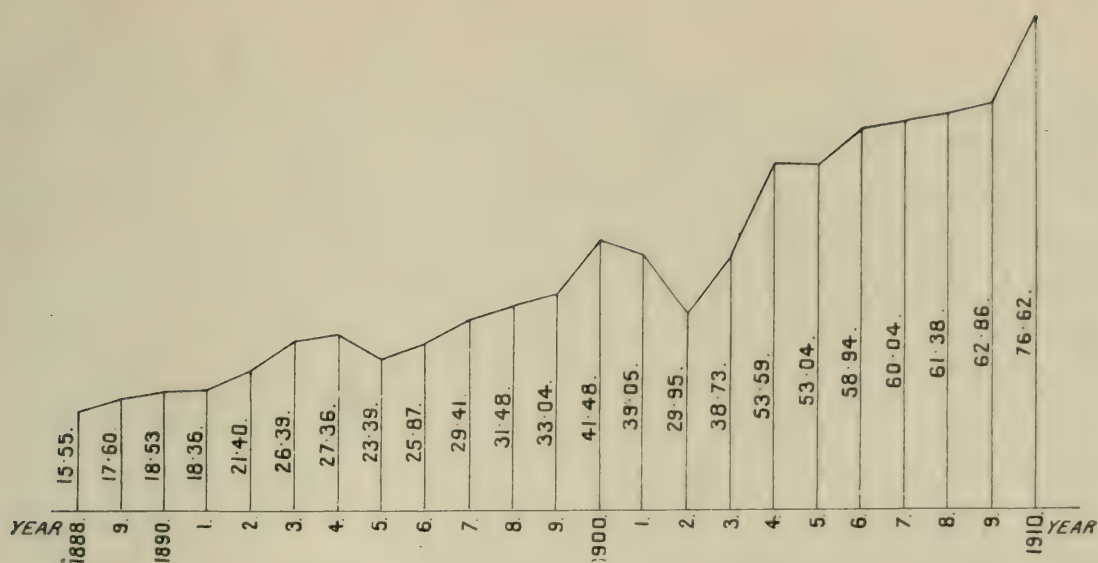
The largest butter factory in Australia is that of the North Coast Co-operative Company, situated at Byron Bay, and from it the butter is sent by steamer direct to the great ocean liners, which leave Sydney every week for the British and European ports.

A large amount of this Company's produce—butter, bacon, small goods, ice and fertilisers—is sold locally. In the early days of its existence—it began operations in 1895—Sydney was practically its sole market, but now it sends its produce to England, South Africa and Western Australia with profitable results. The turnover in 1895 was £7,500, in 1910 over £800,000, and its total turnover to 1910 exceeded £4,000,000 sterling.

In many parts of the State pig raising and bacon curing are carried on in conjunction with the butter making, and every year New South Wales produces about 16,000,000 lbs. of bacon and ham.

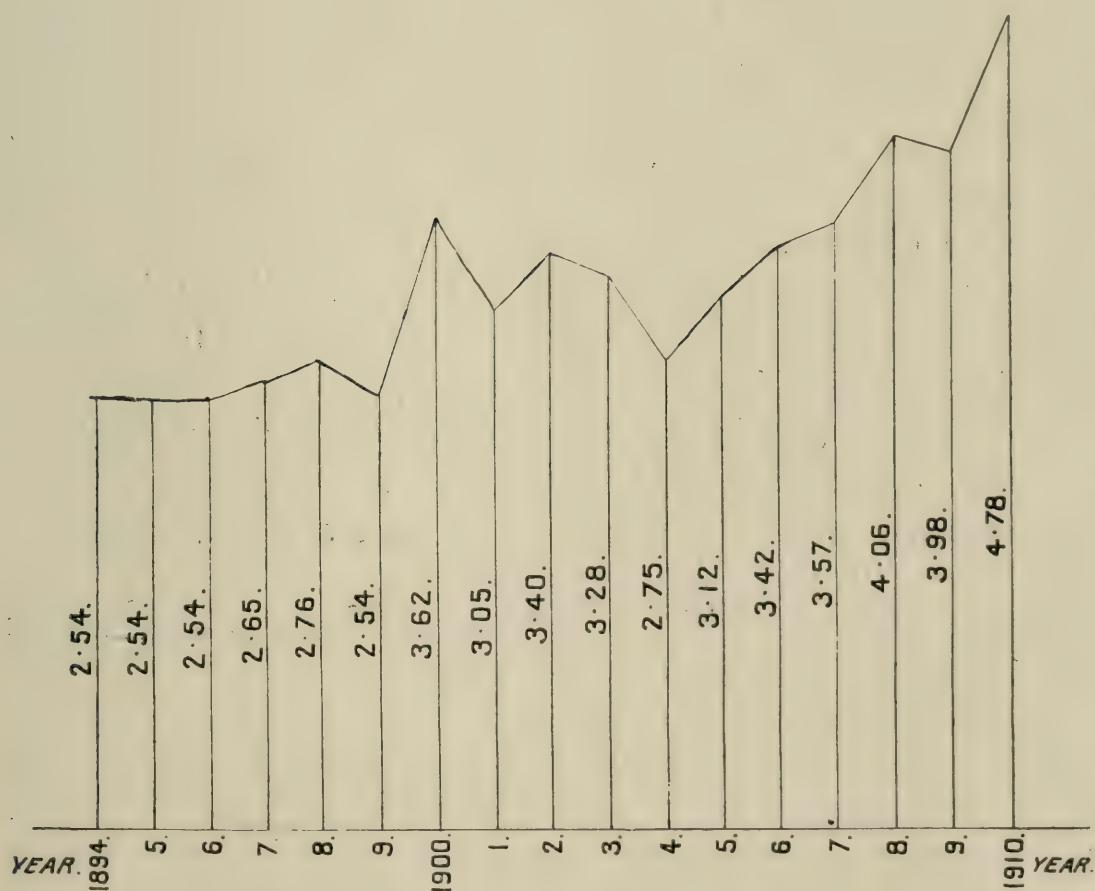
Poultry farming and *bee farming* are not important State industries. They are for the most part carried on as adjuncts to agricultural or dairying industries.

Fruit growing affords profitable employment for thousands of people in New South Wales, where practically all kinds of fruit can be produced. English fruits—apples, plums, cherries, etc., are largely grown on the tablelands. Here mixed farming is largely carried on, fruit



YEARLY PRODUCTION OF BUTTER IN NEW SOUTH WALES.

Expressed in millions of pounds weight.



YEARLY VALUE OF DAIRYING PRODUCT OF NEW SOUTH WALES.

Figures represent pounds sterling in millions and decimals.
i.e., year 1904, £2,750,000 or £2 $\frac{3}{4}$ millions.

growing proving a profitable undertaking in conjunction with dairy farming, wheat growing, or stock raising. On the Northern rivers pineapples, mangoes, paw-paws, passion-fruit, oranges and lemons are successfully grown, while throughout most of the coastal area and up to an elevation of 1,500 feet above sea level, large quantities of peaches, plums, apricots, nectarines, pears, apples, passion-fruit, oranges, lemons and grapes are produced. Along the western flanks of the tablelands there are immense tracts of lands admirably adapted for the production of fruits for canning and drying purposes.

The fruit factories of the State turn out every year immense quantities of the very best jams and fruits, which find a ready sale, not only in the local markets, but in the neighbouring States and in Great Britain.

The Government has established experimental orchards in different districts. Large quantities of fruits of different varieties are grown at these orchards so that people interested in the industry may be enabled to ascertain at first hand the kind of fruit likely to do best in any particular district.

Government fruit experts too, are available in cases where information is needed by the growers as to the best methods of exterminating fruit pests.

In Riverina and in the Hunter River district grapes are cultivated extensively and profitably, and the wines from these districts have long ago established a great name for themselves in the European markets. Extensive vineyards are also met with on the Hawkesbury River, within easy reach of the metropolis, and also around the important country towns of Mudgee and Tamworth.

The *timber* resources of the State are of great value, and the hardwoods have achieved for themselves a world-wide reputation, especially for wood paving and for railway sleepers. The hardwoods comprise ironbark, tallow-wood, blackbutt, stringybark, turpentine, blue gum, spotted gum, grey gum, red and white mahogany, box (red, grey and yellow), and forest red gum.

A very large trade is carried on in hardwood railway sleepers for local use, and also for the oversea markets in England, Germany and South Africa. Turpentine piles for piers and wharfs are in great request, for they are not attacked under water by the teredo; indeed, turpentine piles "have been found to be in such sound condition on being drawn after thirty years' service in the water, that they have been used again in new structures."

It is not alone in connection with the hardwoods that New South Wales takes high rank, for the coastal brushes yield excellent softwoods, grained and marked most beautifully, and capable of taking a high polish. These woods are well suited for some of the finest kinds of cabinet making. The principal softwoods are red cedar, rosewood, black and red bean, onion wood, white beech, silky oak, coachwood, tulipwood, colonial pine and native teak.

New South Wales possesses 20,000,000 acres of timbered land, and of this 7,500,000 have been reserved and set apart for the conservation of the timber supply.

The *Fisheries* of the State, while affording employment at present to a large number of men, are as yet, comparatively speaking, undeveloped, and their present-day value and importance are practically as nothing compared with the vast possibilities which the future holds. The numberless inlets, spacious harbours and extensive rivers teem with fish life. There are no less than 550 species, and of these about 250 are of a good edible character. About 12,000,000 lbs. of fish pass through the New South Wales fish markets every year, and at least 3,000,000 lbs. are caught and disposed of in other ways. The most important kinds at present marketed along the coast are the schnapper, bream, flathead, rock cod, jewfish, blackfish, mullet, whiting, trevally and garfish, while the larger inland rivers—the Murray, Murrumbidgee, Darling, etc.—are rich in fish life, at the head of which stands the Murray cod, weighing at times from 40 to 80 lbs.

Port Stephens, Lake Macquarie, Lake Illawarra, Tuggerah Lakes, Hawkesbury River, Jervis Bay, Port Macquarie and the Clarence and Richmond Rivers are pre-eminently adapted for fish-curing establishments on an extensive scale, for fish of the finest species and in almost inexhaustible quantities are at all seasons of the year obtainable at these places.

The oyster yield of the State is of considerable value, and every year over 20,000,000 of oysters are taken off the New South Wales oyster beds. The chief oyster-bearing waters are (1) the Richmond, Clarence, Bellinger, Nambucca, Macleay and Manning Rivers on the North Coast; (2) Camden Haven, Wallis Lake and the Hunter and Hawkesbury Rivers; and (3) the Crookhaven, Clyde and Pambula Rivers.

Many years ago Sydney was a whaling port of considerable importance, and many whalers used to make Port Jackson their headquarters. Nowadays, the whaling industry is confined to Twofold Bay, although whales are often to be found off various parts of the coast. The whales are captured for their oil and their whalebone. "At Twofold Bay, whalers are greatly assisted by the killers or Killer Whales, which harass and pursue the whales, usually clustering about the head, and hanging on to the lower lip in an attempt to force open the leviathan's mouth, with the object of getting at its tongue, which is their special titbit. The killers hem the whales in towards the shore, so that the latter are caught between the whalers and them."

MANUFACTURES.

The *Manufactures* of the State are of a varied character. They comprise:—(i.) *Works connected with the preparation of food products, e.g.,* sugar mills and refineries, flour mills, meat-preserving works, breweries, butter, cheese, bacon, biscuit and jam factories, etc.; (ii.) *clothing and textile fabric factories, e.g.,* boots and

shoes and clothing factories, &c.; (iii.) *metal, works, e.g., engineering and boiler-making works, iron foundries, electrical engineering works, agricultural implements and smelting works, &c.*; (iv.) *works connected with the supply and preparation of building materials, e.g., potteries, joinery and brick works, stone-crushing and asphalting works, lime and marble works, &c.*; (v.) *shipbuilding and repairing works and docks*; (vi.) *coachmaking and saddlery works*; (vii.) *printing and bookbinding establishments and paper mills*; (viii.) *furniture works*; (ix.) *arms and explosives factories*; (x.) *soap, drugs, chemicals and fertiliser factories*; (xi.) *coke works, gas and kerosene works.*

The annual output in connection with the manufacturing industries of New South Wales is valued at over £40,000,000; the wages paid every year at nearly £8,000,000; the plant and machinery at over £10,000,000. The number of hands employed is 91,000, of whom 22,000 are females.

The principal seats of the manufacturing industry are Sydney, Newcastle, central Illawarra and Lithgow. Sydney is, of course, the most important centre; the population in and around it is dense, and it holds a commanding position as regards communication with the outside world, while it is, at the same time, within easy reach by rail or sea of the localities whence the raw materials are obtained. At the other centres, nearness to coal is the attraction.

IMPORTS.

New South Wales carries on an extensive and growing import and export trade, chiefly with the British Islands, France and Germany, Canada and the United States, Japan, China and India, South Africa, the other Australian States and New Zealand, and several of the island groups of the Pacific.

The annual value of the imports is about £40,000,000, while that of the exports is over £42,000,000.

The chief articles of import are included in the following list:—

(i.) From *British Islands*.

Apparel and textile fabrics (including silk, woollen, cotton and flax manufactured materials), machines and machinery, iron and steel, plated ware, alcoholic drinks, tobacco and other narcotics, cocoa and chocolate, arms, ammunition and explosives, paper, books and periodicals, cutlery, fancy goods, drugs and chemicals (alkalies and fertilisers), electrical materials and gas appliances, furniture, glassware, jewellery, leather, boots and shoes and other leading manufactures, paints and colours, preserved milk, pickles and sauces, tools of trade, vehicles (including bicycles, motors, etc.), ships and cordage, tinned plate, wire netting, India rubber manufactures and brushware.

N.S.W. IMPORTS (OVERSEA) 1910.		
FROM UNITED KINGDOM 62%	FROM OTHER BRITISH POSSESSIONS 14%	FROM FOREIGN COUNTRIES. 24%
TOTAL VALUE £23,238,993		

N.S.W. PRODUCE EXPORTED (OVERSEA) 1910.		
TO UNITED KINGDOM 44%	TO OTHER BRITISH POSSESSIONS 5%	TO FOREIGN COUNTRIES 51%
TOTAL VALUE £27,677,000.		

N.S.W. PRODUCE EXPORTED (OVERSEA) 1910.			
PASTORAL 62%	AGRICULTURE AND DAIRYING. 14½%	MINING 16½%	ALL OTHER 7%
TOTAL VALUE £27,677,000.			

(ii.) From *British Possessions*.

- (a) *Canada*: Agricultural implements and machinery, paper, timber (softwoods), bicycles and other vehicles, rails and fish-plates, fish, drugs and chemicals.
- (b) *India*: Bags and sacks, canvas and hessians, carpets and mats, tea and coffee, cotton, spices, shellac, manures, oils, paraffin wax.
- (c) *Ceylon*: Tea, coffee and chicory, and nuts.
- (d) *Straits Settlements*: Sago and tapioca, spices, paraffin wax, benzine and other oils, wicker-work.
- (e) *South Africa*: Precious stones, tanning bark.
- (f) *Fiji*: Sugar and molasses, bananas, copra.

- (g) *New Zealand*: Horses, sheep, fibres, fish, hops, skins and hides, timber, cordage and twines.

(iii.) From *Foreign countries*.

- (a) *Germany*: Ale and beer, apparel and textiles, machines and machinery, musical instruments, wire netting, fancy goods, drugs, chemicals (chiefly calcium carbide), india-rubber manufactures, arms, ammunition and explosives, iron and steel, manufactured goods, plate and sheet iron, pipes, tubes and railway iron, wire, paper and stationery, paints and varnishes, jewellery and cameos, lamps and lampware, electrical and gas appliances, leather and leather goods, glassware and furniture.
- (b) *France*: Apparel and textiles, motor vehicles and parts, spirits, wine, machinery and metal manufactures, cream of tartar, jewellery, clocks and watches, rubber manufactures, pipes (smoking), drugs and chemicals, fancy goods, leather goods and tiles.
- (c) *Austria-Hungary*: Apparel and textiles, furniture, chinaware, glassware, fancy goods, jewellery, pipes (smoking).
- (d) *Belgium*: Apparel and textiles, iron and steel manufactures, metal manufactures, railway iron, jewellery, matches, glass and glassware, drugs, chemicals and fertilisers, motors and parts, wire and wire netting.
- (e) *Italy*: Apparel and textiles, marble and stone, sulphur, fruits, oils, nuts, motors and parts, matches.
- (f) *Sweden*: Cream separators, paper, timber, calcium carbide, matches, telephones.
- (g) *Switzerland*: Apparel and textiles, watches, cocoa and chocolate, cigars, preserved milk.
- (h) *Norway*: Timber, paper, calcium carbide, fish.
- (i) *Russia*: Timber, flax, oils.
- (j) *China*: Tea, rice, apparel and textiles (silk), ginger, nuts, oils.

- (k) *Java*: Sugar, kapok, rice, cotton, tobacco.
- (l) *Phillipine Islands*: Flax and hemp, cigars.
- (m) *United States of America*: Kerosene and lubricating oils, tobacco and cigars, machines and machinery, timber, vehicles, bicycles and motors, leather, boots and shoes, apparel and textiles, plate, sheet and railway iron, iron and steel girders, tools of trade, cameras, magic lanterns and phonographs, ammunition and explosives, clocks and watches, paper and stationery, wood manufactures, musical instruments, India-rubber manufactures, naphtha, paraffin wax and turpentine.
- (n) *Chili*: Nitrate of Soda.

EXPORTS.

(i.) To the *British Islands*.

Wool, wheat, butter, frozen mutton, frozen lamb, frozen beef, frozen rabbits, tinned meats, tallow, hides and skins, fruit (apples), gold, copper, silver, silver-lead ore, tin, hardwoods, wine, leather, bones, horns and hair.

(ii.) To *British Dominions*.

- (a) *Canada*: Butter, meats, skins, wool and timber.
- (b) *India and Ceylon*: Timber, horses, gold, silver, coal, copper, lead and wheat.
- (c) *Cape Colony*: Wheat, butter, leather, frozen beef, mutton and lamb, sheep, flour, leather.
- (d) *Fiji*: Metal manufactures, apparel and textiles, boots and shoes, biscuits, coal, bran and pollard, flour, machines and machinery, oils, timber, bags, sacks and cordage.
- (e) *Hongkong*: Gold, coal, lead, timber, butter, fish and flour.
- (f) *Natal*: Flour, butter, wheat, horses and sheep, sugar, gold, frozen meat, mutton and rabbits, tallow.

- (g) *New Zealand*: Machinery, coal, timber, apparel and textiles, tobacco, india rubber manufactures, gold, flour, books and stationery, soap, sugar, leather and leather manufactures, fruit (fresh and dried).
- (h) *Papua*: Apparel and textiles, tobacco, meats, and flour.
- (i) *Straits Settlements*: Tin, coal, flour, tinned meats, horses, hardwoods.
- (iii) *To Foreign Countries*.
 - (a) *Germany*: Wool, hides and skins, gold, copper, silver and silver-lead, zinc, lead, wolfram, sausage casings, fruit, wheat, timber, tanning bark.
 - (b) *France*: Wool, hides and skins, silver, zinc, copper, lead.
 - (c) *Belgium*: Wool, copper, zinc concentrates, hides and skins, silver ore, lead, tin, wheat, leather, timber.
 - (d) *Italy*: Wool, wheat, skins, tallow, lead.
 - (e) *Netherlands*: Silver, zinc, lead, tallow, hides and skins.
 - (f) *China and Japan*: Wool, gold, tallow, wheat, lead, butter.
 - (g) *Philippine Islands*: Coal, flour, butter, beef and mutton, horses, wheat, timber.
 - (h) *Java*: Flour, butter, coal, horses, gold, meats.
 - (i) *United States of America*: Wool, hides and skins, copper, gold, silver, coal.
 - (j) *Peru*: Wheat and coal.
 - (k) *Chili*: Coal.

GOVERNMENT.

The legislative affairs of New South Wales are in the hands of (i.) THE AUSTRALIAN COMMONWEALTH GOVERNMENT, and (ii.) THE STATE GOVERNMENT.

COMMONWEALTH LEGISLATURE.

The Commonwealth Legislature consists of (i.) The GOVERNOR-GENERAL, who represents the Sovereign; (ii.)

The SENATE (consisting of 36 members—six from each of the six States of the Commonwealth), elected for six years, and (iii.) the HOUSE OF REPRESENTATIVES (consisting at present of 75 members, chosen from each State on a population basis).

Members of both Houses receive out of the public revenues a salary of £600 per annum, while the annual salary of the Governor-General is £10,000. Lest the Senate should get out of touch with public opinion, half of the Senators retire every three years; thus elections to the Senate are triennial.

In the election of Senators, each State is counted as a single electorate, but for the election of the members of the House of Representatives, New South Wales is divided at present into 27 electorates, each returning one member. Victoria will send in 1913 21 members to the House of Representatives, Queensland 10, South Australia 7, Western Australia 5, and Tasmania 5.

The House of Representatives is elected for three years, but it may be dissolved sooner at the discretion of the Governor-General. Members of the Senate are chosen for six years. Woman suffrage prevails, so that all adults have the right to vote at all elections for the Commonwealth Legislature.

The following are the most important matters on which the Commonwealth Parliament has power to legislate:— (i.) Defence (naval and military); (ii.) postal services, telegraphs and telephones; (iii.) taxation (without discrimination between States or parts of States); (iv.) bounties on the production or export of goods—each bounty to be uniform throughout the whole of the States; (v.) light-houses, beacons, etc.; (vi.) quarantine; (vii.) naturalisation and aliens; (viii.), immigration and emigration; (ix.) census and statistics; (x.) astronomical and meteorological observations; (xi.) invalid and old-age pensions; (xii.) copyrights, patents, and trade marks; (xiii.) bills of exchange and promissory notes; (xiv.) weights and measures; (xv.) marriage and divorce; (xvi.) conciliation and arbitra-

tion in order to prevent or to settle industrial disputes extending beyond the limits of any one State; (xvii.) the acquisition, with the consent of a State, of any State railway; (xviii.) the control of State railways for the naval and military purposes of the Commonwealth; (xix.) any matter handed over to the Commonwealth Parliament by any State Parliament or Parliaments, and accepted by the Commonwealth Parliament (the laws framed in such matter to extend only to the State by whose Parliament the matter has been handed over, or to any State which afterwards adopts the law); and (xx.) external affairs generally.

It has also exclusive power to make laws for the control of the Seat of Government of the Commonwealth, and the Northern Territory.

The Seat of Government of the Commonwealth is at present in Melbourne, but in course of time it will doubtless be transferred to a site already surveyed in the FEDERAL TERRITORY in the Yass-Canberra district of New South Wales. This territory, which covers an area of 900 square miles, lying mainly to the west of the Goulburn to Cooma railway, and south-west of Lake George, has been ceded to the Commonwealth by the State Legislature. New South Wales has also ceded to the Commonwealth a tract of land along a portion of the foreshores of Jervis Bay, and the right to connect this by railway with the main Federal Territory, so that the future Federal Capital may have access to the ocean.

Money and taxation bills may not originate in the Senate, and the Senate may not amend such bills when sent to it from the House of Representatives.

If the Senate rejects any proposed legislative measure passed by the House of Representatives, or passes it with amendments that are not acceptable to the House of Representatives, then the Governor-General—after a lapse of three months, and after a second passing of the measure by the House of Representatives and a second rejection by the Senate—may dissolve the Senate and House of Representatives at the same time. If, after such dissolu-

tion, the House of Representatives again passes the same measure, and the Senate still rejects or fails to pass it, the Governor-General may then convene a joint sitting of the members of the Senate and of the House of Representatives. If at this joint sitting a majority of the total members present agree to the proposed measure, it shall then be taken to have been duly passed by both Houses of Parliament, and on being assented to by the Governor-General shall become law.

The judicial powers of the Commonwealth are vested in (i.) THE HIGH COURT OF AUSTRALIA, and (ii.) such other courts as Parliament invests with federal jurisdiction.

The Revenues of the Federal Government are derived chiefly from (i.) Customs and excise duties; (ii.) land tax; (iii.) charges for postal, telegraphic and telephonic services; (iv.) charges in connection with copyrights, patents, and trade marks; (v.) profits from coinage and banking.

The main heads of expenditure of the Federal Government are in connection with (i.) Military and naval defence; (ii.) old age pensions; (iii.) postal affairs, telegraphs, telephones; (iv.) the collection of customs and excise duties and land tax; (v.) sugar and iron bounties; (vi.) administration of Papua and the Northern Territory.

The gross Commonwealth revenue from customs and excise duties is over £13,000,000, and the cost of collection about £330,000.

THE STATE LEGISLATURE.

The legislature of New South Wales deals with all matters except those controlled by the Commonwealth legislature.

The State legislature consists of (i.) The State Governor; (ii.) The Legislative Council, or Upper House, and (iii.) the Legislative Assembly, or Lower House.

The STATE GOVERNOR represents the Sovereign, in whose name he assents to all bills passed by the State Parliament, reserving for the Royal assent certain classes of bills in terms of "instructions" issued to him by the

Imperial Government. He is guided, as a rule, by his Ministry, but is free to exercise his own discretion in regard to the granting or withholding of a dissolution of Parliament, or in connection with the appointment of a new Ministry.

The LEGISLATIVE COUNCIL consists now of about 50 members, chosen and appointed in the first instance nominally by the State Governor, but actually by the Ministry. They hold office for life and receive no payment for their services. Legislative Councillors must be male adults, natural born or naturalised British subjects. The Legislative Council cannot alter money bills, nor can money bills originate in it. The numerical strength of the Council is, in terms of a long standing custom, about half that of the Legislative Assembly.

The LEGISLATIVE ASSEMBLY at present contains 90 members, chosen by the electors of 90 separate constituencies, each returning one member, and each, as far as practicable, containing the same number of electors. The duration of the assembly is limited to three years, and each member receives an allowance of £300 per annum. Women, as well as men, have the right to vote in connection with all elections for the Legislative Assembly.

The Cabinet System of Government prevails, and in accordance with it, the Governor's advisers (called *The Ministry*), are chosen from that political party which commands the confidence of the majority in the Legislative Assembly. The member chosen by the Governor to form a Ministry is called the *Premier*. He directs legislative business in Parliament, and is the channel of communication between Governor and Parliament. The Ministry, sitting in private for the discussion of their policy and general line of action is called the *Cabinet*. No record is kept of proceedings at Cabinet meetings. The EXECUTIVE COUNCIL consists of a meeting of the Ministry, called together by the Premier for the transaction of public business, and presided over by the Governor. Records are kept of all business transacted at meetings of the Executive

Council, and its decisions are, as a rule, notified to the public in the columns of the "Government Gazette."

The administration of the public affairs of New South Wales is at present in the hands of the following nine Ministers:—(i.) Premier and Chief Secretary; (ii.) Attorney-General; (iii.) Minister of Justice and Solicitor-General; (iv.) Colonial Treasurer; (v.) Secretary for Lands and Minister of Labour and Industry; (vi.) Secretary for Public Works; (vii.) Minister of Public Instruction; (viii.) Secretary for Mines; (ix.) Minister for Agriculture, and (x.) Vice-President of the Executive Council and Representative of the Government in the Legislative Council.

The chief matters dealt with or under the control of each Minister, are set forth below:—

THE PREMIER AND CHIEF SECRETARY: Business connected with both Houses of Parliament, including official publication of debates; control of Executive Council Office and Agent-General's Department; Intelligence Department and Tourist Bureau; Immigration; Correspondence with British, Commonwealth and States' Governments; Public Health; appointment of magistrates; hospitals and charitable institutions; care and treatment of the insane and inebriates; general election and franchise; statistics.

THE ATTORNEY-GENERAL, MINISTER OF JUSTICE, etc.: Advising Government on all legal matters; business relating to judges, courts, remission of sentences and fines; control of court-houses and gaols.

COLONIAL TREASURER: Financial matters generally; management of consolidated revenue; loans; public debt; payment of Imperial and State pensions; purchase and issue of stores for public departments; Government Railways and Tramways; Government Printing Office; Sydney Harbour Trust; tenders and contracts for public supplies; State clothing factory; storage and issue of explosives; and navigation.

SECRETARY FOR LANDS, ETC.: (a) All matters connected with land held under the various Crown Lands Acts; Land

Appeal Courts; Land Boards; survey of Crown Lands; Crown Land Agents; Trigonometrical survey of the State; dedication, reservation and exchange of lands; making lands available for settlement; (b) the regulation of the working conditions in shops and factories; early closing of shops; inspection to ensure carrying out of wages awards; the prevention and settlement of industrial disputes by friendly negotiation; publication of industrial statistics and awards, and industrial matters generally.

SECRETARY FOR PUBLIC WORKS: Erection, maintenance, and repair of public works and public buildings; construction of dredges, punts, machinery for Government purposes; construction of railways, tramways, harbour works, docks, water supply and sewerage works; sinking of artesian bores, tanks, and wells on public stock routes; supervision of lifts, scaffoldings, etc.

MINISTER OF PUBLIC INSTRUCTION: All matters dealing with education, *e.g.*, the establishment, conduct and inspection of primary, high, technical, continuation and trade schools; training, appointment, examination and control of teachers; awarding of scholarships and bursaries; medical inspection of school children; school agriculture: rural camp schools for city children.

SECRETARY FOR MINES: Mining affairs generally, geological and mining surveys; inspection of mines; money grants to prospectors; assays.

MINISTER FOR AGRICULTURE: Matters relating to agriculture; forestry and stock; State experimental farms—agricultural and stud; agricultural colleges; Sydney Botanic Gardens, Domain, Centennial Park; irrigation farms; supervision of dairies for instructional purposes; destruction and prevention of fruit pests; publication of “Agricultural Gazette” and periodical agricultural bulletins for the information of farmers.

At present, the Minister for Lands, the Minister for Works, and the Minister for Agriculture constitute the *Murrumbidgee Northern Irrigation Trust*, under whose control the important and highly responsible task of con-

structing the huge irrigation channels, etc., at Leeton (Yanco) is being carried out.

VICE-PRESIDENT OF EXECUTIVE COUNCIL, etc.: Presides at meetings of the Executive Council in the absence of the Governor or Lieutenant-Governor; represents the Government in the Legislative Council, and controls the business of that Chamber.

The REVENUES of New South Wales are derived chiefly from the following sources:—(i.) The grant from the Commonwealth Government of an annual sum of 25 shillings per head of population until 30th June, 1920 (and thereafter until the Commonwealth Parliament otherwise provides); (ii.) railway and tramway earnings, and earnings from other public services; (iii.) income tax; (iv.) probate and succession duties; (v.) stamp duties; (vi.) returns from sales or rents of Crown Lands; (vii.) licenses, fines and fees.

The State revenues are spent chiefly in connection with the following:—(i.) Paying interest on National Debt; (ii.) working railways and tramways; (iii.) education (building and maintaining schools, paying teachers, etc.); (iv.) administration of justice; (v.) police, gaols and reformatories; (vi.) hospitals and other charitable institutions; (vii.) Parliament and elections, and (viii.) salaries of officers of the public service.

SUBMARINE CABLES.

Sydney is connected by overland telegraph with the other Australian capitals, while the line from Adelaide across the continent to Port Darwin—completed in 1872, at a cost of half a million pounds sterling—is an important link in one of the lines of communication between New South Wales and London.

The trade of New South Wales is greatly aided by the various submarine cables, which place Australia in communication with the other continents.

These cables have been laid down as follows:—

- (i.) From Port Darwin to Banjoewangie in the island of Java. The line of communication then runs from Banjoewangie by overland wire through Java to Batavia, and thence by cable to Singapore and Madras. From Madras it is continued to Europe *via* Bombay.

The first cable from Port Darwin to Banjoewangie was completed in 1871, and in order to minimise inconvenience caused from time to time by interruptions caused by injuries to the existing submarine line through volcanic and earthquake disturbances chiefly, a duplicate cable was laid down eight years later between the same places.

- (ii.) From Broome on Roebuck Bay (Western Australia) to Banjoewangie.

Broome has telegraphic communication with the Eastern States of Australia *via* Perth, Albany, Eucla and Port Augusta.

- (iii.) Across Bass Strait from Flinders, near Cape Schanck in Victoria, to the mouth of the River Tamar in Tasmania. This cable was completed in 1869.

In 1909, two additional cables were laid between Victoria and Tasmania at the instance of the Commonwealth Government.

- (iv.) From Fremantle, *via* Cocos (or Keeling) Island, Mauritius, Durban, Capetown, Madeira, Penzance (Cornwall), and thence to London.
- (v.) From Fremantle to Adelaide. This cable forms an alternative line of communication between the Eastern States and Western Australia.
- (vi.) From Southport (Queensland), to Norfolk Island, Fiji, Fanning Island, and Bamfield (Canada). Communication is thence continued across Canada.

and thence across the Atlantic to England. This is the ALL-RED CABLE, jointly owned by Britain, Canada, and the Australasian colonies, and controlled by the Pacific Cable Board, consisting of seven members (two from Great Britain, two from Australia, two from Canada, and one from New Zealand). A branch of this cable connects Norfolk Island with New Zealand.

- (vii.) From Port Darwin *via* Banjoewangie, Batavia, and Singapore to Hongkong. From Hongkong, communication may be continued *via* Shanghai, Possiet Bay (Pacific Russia), and Libau (Baltic Russia), to England.
- (viii.) From New South Wales to New Zealand. This cable was laid in 1876, and has a length of nearly 1,200 miles. It starts from a point within a stone's throw of the La Perouse mounment at Botany Bay, and its New Zealand terminus is near the town of Nelson in the South Island, with a branch line across Cook Strait to Wellington.
- (ix.) From Bundaberg on the Queensland coast to New Caledonia. This cable belongs to a French company, which is subsidised by the Governments of Queensand and New South Wales to the amount of £2,000 each annually. This arrangement is to last for 30 years from 1893, the year in which the cable was opened for use.

The present cable rates from Sydney to London are, for ordinary messages, 3s. per word; while *Press* messages are sent at the rate of 9d. per word. Both ordinary and *Press* messages can be sent at half price if "deferred," *i.e.*, if the sender agrees to their being delayed in transmission, if necessary, for not more than 24 hours.

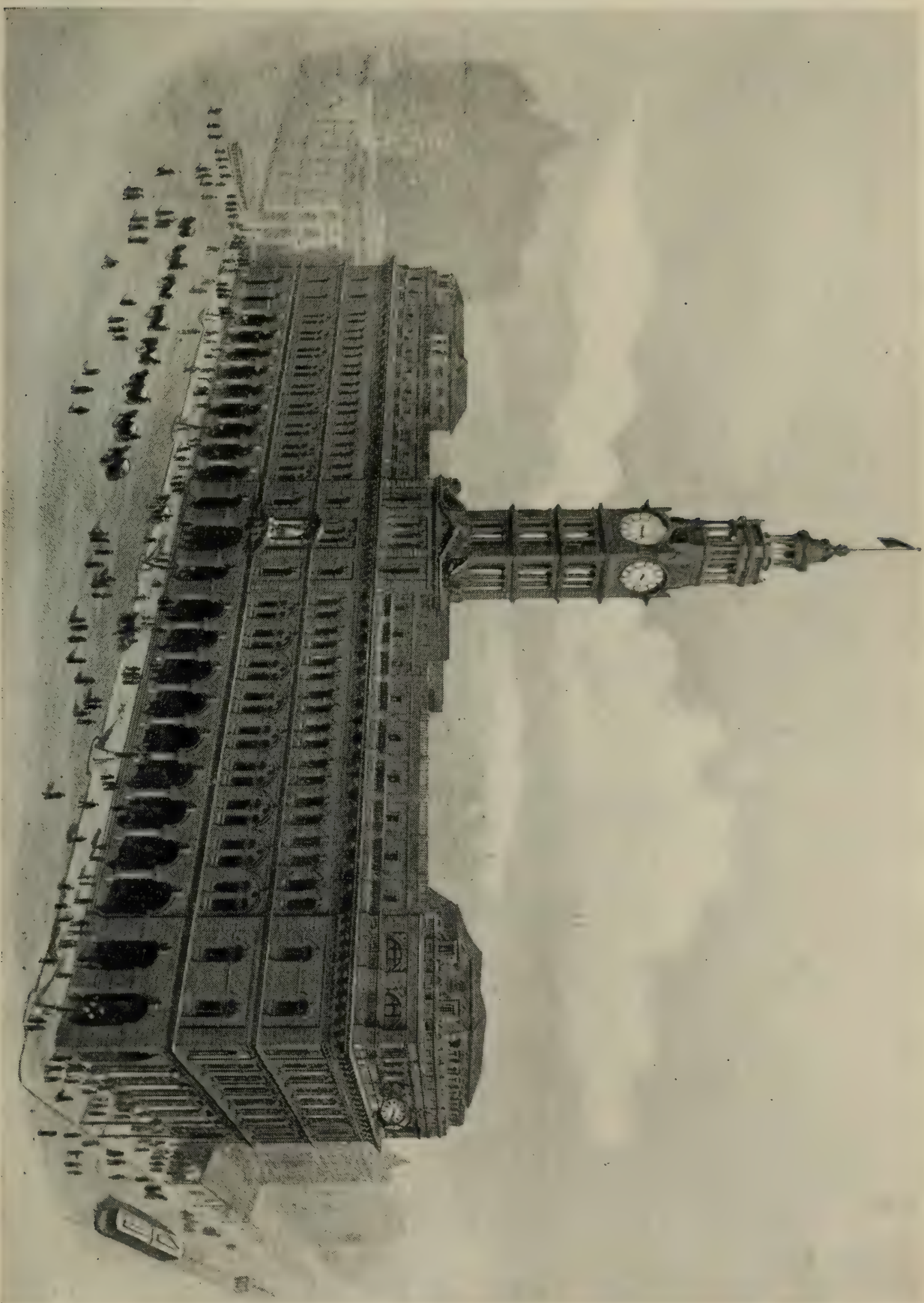
Cables from Australia to New Zealand cost at present 4½d. per word.

TOWNS OF THE COAST DISTRICT.

(a) IN THE COUNTY OF CUMBERLAND.

SYDNEY, the State capital, stands on the southern shores of Port Jackson, and its suburbs extend south towards Botany Bay, east towards "The Heads," five miles away, and west as far as Parramatta, distant fifteen miles by rail from the metropolis. Another series of rapidly-growing residential suburbs extends from North Sydney (on the northern shores of Port Jackson), along the Milson's Point to Hornsby railway line. The total population of Sydney and its suburbs is roughly 700,000. The city was founded on 26th January, 1788, by Captain Phillip, and was named after Viscount Sydney, at that time Secretary of State for the Colonies. Perhaps no city in the world has fairer natural surroundings. For mile after mile its capacious harbour extends in sweeping curves round an endless succession of bays and small peninsulas, and constitutes a never-ending source of enjoyment, both to the inhabitants and to visitors. The city proper, as appears from the winding nature of many of its old streets, has grown with the country's growth, "without much forethought, and certainly without much deliberate plan. In the old charts and views, the outline of what is now George-street, and the main artery of the city, may be traced as a winding bullock-track, starting from the vicinity of Dawes Point (or of what was once the King's Stairs), and pursuing its sinuous way round obstacles and past certain fixed points, without any regard whatever to mathematical directness." During recent years some of the oldest settled and most congested residential areas of the city have been resumed by the Government and the City Council. This was done at considerable cost to provide on the one hand more abundant and up-to-date shipping accommodation, and on the other to permit of the demolishing of old and dilapidated buildings, and the erection in their place of more commodious buildings. The Post Office, Town Hall, cathedrals, churches, and hospitals, the University, Tech-

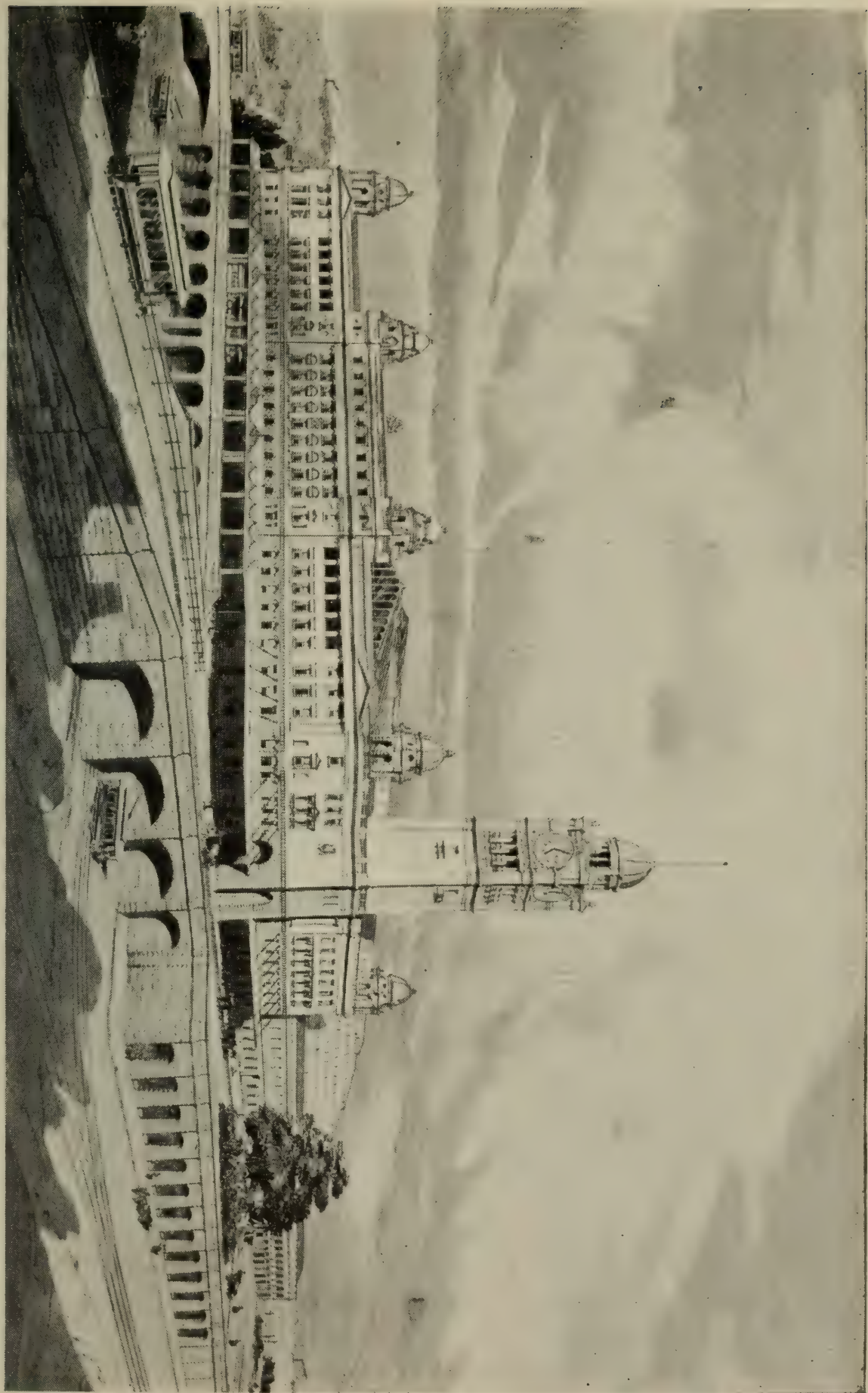
nical College, Municipal Markets, and the chief public offices, all bear evidence of the enterprise and prosperity of the State and its inhabitants. The Town Hall is one of the largest in the world, and contains one of the largest organs ever constructed. Sydney is a great trading port, and gives employment to a large fleet of steamers and sailing vessels. It possesses 200 miles of water frontage suitable or capable of being made suitable for shipping. Vessels of very high tonnage are able to berth alongside the wharves that have been built at Circular Quay, Miller's Point, Darling Harbour, Woolloomooloo Bay, and other parts of Port Jackson. All the important railway lines of the State converge upon Sydney, and swell the volume of its trade. The railway terminus for the heavy goods traffic is situated at Darling Harbour, where—as well as at Circular Quay—wool, wheat, butter, fruit, frozen beef and mutton, tallow, coal and other staple products of the State are shipped to the oversea markets. Numerous manufacturing establishments are constantly at work, *e.g.*, sugar refinery, engineering establishments (including the extensive Government railway workshops at Redfern), smelting works, coach and boot factories, tweed, flour, and paper mills, ice works, &c. Sydney possesses abundant facilities for the repair of the largest vessels afloat. The Sutherland Dock, built by the Government at Cockatoo Island, is said to be one of the largest graving docks in existence. It is excavated out of the solid rock, and is provided with some of the most powerful and modern appliances. It is 630 feet long and 108 feet wide, and the depth of water over the sill is 32 feet. At the Fitzroy Dock, also at Cockatoo Island, scores of men are engaged at present in building some of the cruisers for the Commonwealth navy, as well as carrying on other important constructional and refitting work. Besides these, Mort's Dock at Balmain, and the Atlas and the Jubilee Docks are in constant requisition. The surrounding districts yield sandstone suitable for building purposes, and, as a result, the city, from an architectural point of view, bears a substantial character.



GENERAL POST OFFICE—SYDNEY.

Sydney is well provided with parks, chief among which is the Botanic Gardens. The Governor-General's residence is situated immediately north of the Upper Gardens. Adjoining the Botanic Gardens on the southern side is the Domain, a favourite recreation ground, in which stands the National Art Gallery. Among the many seaside and holiday resorts are the surf-bathing centres of *Manly*, *Bondi*, *Coogee*, and *Cronulla*, and the extensive national reserves of *National Park* and *Kuring-gai Chase*, the former fronting the Illawarra railway line for about nine miles, and covering an area of 36,000 acres; while the latter, of equal extent, lies south of the Hawkesbury River, and abounds in wild bush and huge gorges, penetrated by long winding offshoots of Broken Bay. The most populous suburbs of Sydney are Redfern, Balmain, Newtown, Marrickville, Leichhardt, Petersham, Summer Hill, Ashfield, Burwood, Woollahra, Paddington, Waverley, Randwick and North Sydney—in fact, suburban Sydney is far more populous than the city itself.

PARRAMATTA, the oldest town in the State except the metropolis, is situated on the Great Western Railway, 15 miles from Sydney, and is the centre of a flourishing fruit-growing district, noted chiefly for its oranges. Adjoining the town is an extensive park (with its century-old oaks), on which stands old Government House, the residence of the early Governors from the time of Captain Phillip (1788), to the end of Sir Chas. Fitzroy's term of office (1853). The town was laid out by Governor Phillip in 1790, and named by him Rose Hill. This was afterwards changed to its present name, which in the blackfellows' language means "head of the waters." Tramways connect the town with the head of the river navigation and with Baulkham Hills. Parramatta possesses a large gaol, and several charitable institutions, industrial schools, and asylums. Among its industries are a tweed factory, soap and candle works, and a tile and pipe manufactory. Within a few miles of Parramatta are *Prospect*, *Castle Hill*, *Dural*, *Galston*, *Carlingford* and *Smithfield*—all



SYDNEY CENTRAL RAILWAY STATION.

(As it will appear when finished.)

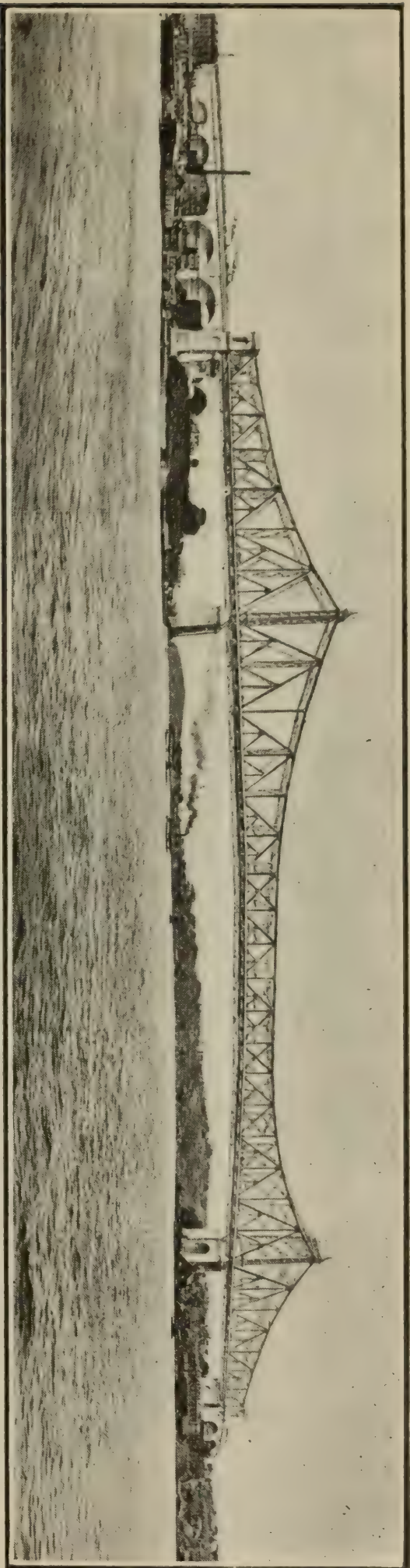
flourishing townships in fruit-growing and agricultural localities. Near *Prospect* is the *Prospect Reservoir*, which covers over 1,200 acres, and in which is stored the water upon which Sydney and its suburbs depend for their daily supply.

LIVERPOOL, another of the oldest towns in the State, is situated at the head of navigation of George's River, and on the Great Southern Railway, 22 miles south of Sydney. It possesses extensive wool-washing and tanning establishments, and a large benevolent asylum.

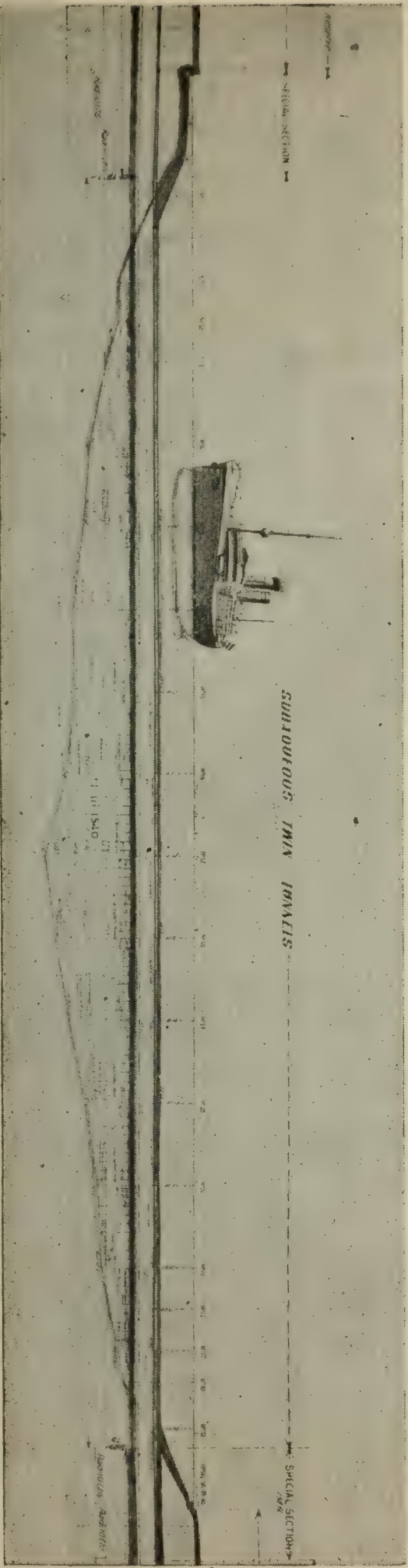
CAMPBELLTOWN, on the Great Southern Railway, 34 miles from Sydney, is surrounded by agricultural and dairy-farming lands. A Government tramway, seven miles in length, which acts as a feeder to the railway, connects Campbelltown with *Camden* (on the Nepean), the centre of a vine-growing and dairying district. About 20 miles south-west of Campbelltown is *Picton*, a railway town, surrounded by a dairy-farming district, and six miles farther west are the Picton Lakes, a favourite shooting ground. Ten miles south of Campbelltown, and on the road to Bulli, is *Appin*, in a farming district. Appin is a quiet holiday resort, four miles from the well-known *Cataract Dam*. L

PENRITH, a town on the Great Western Railway, near the foot of the Blue Mountains, and 34 miles west of Sydney. It is on the east bank of the Nepean, which is here crossed by a large tubular railway bridge. The population of the town includes a large number of railway employees; but the surrounding district is devoted to fruit growing and farming, maize being the principal crop raised. The station yard at Penrith is one of the largest out of Sydney, and has extensive engineering and fitting shops for rolling-stock. The town is lighted by electricity, as also is *Emu Plains*, three miles away, on the opposite bank of the Nepean, and close to where the ascent of the Blue Mountains begins.

ST. MARYS, on the Great Western Railway, five miles east of Penrith, possesses numerous tanneries. The



PLAN OF PROPOSED NORTH SHORE BRIDGE (FROM DAWES POINT TO MILSON'S POINT.
 Bottom of Bridge will be 170 feet above high water. The Bridge will carry heavier traffic than any other in the world. The plan provides for (i.) double line of railway, (ii.) double line of tramway, (iii.) a 35 ft. roadway, and (iv.) two 10 ft. footpaths.



PLAN OF PROPOSED TUNNEL UNDER SYDNEY HARBOUR (SYDNEY TO NORTH SYDNEY).

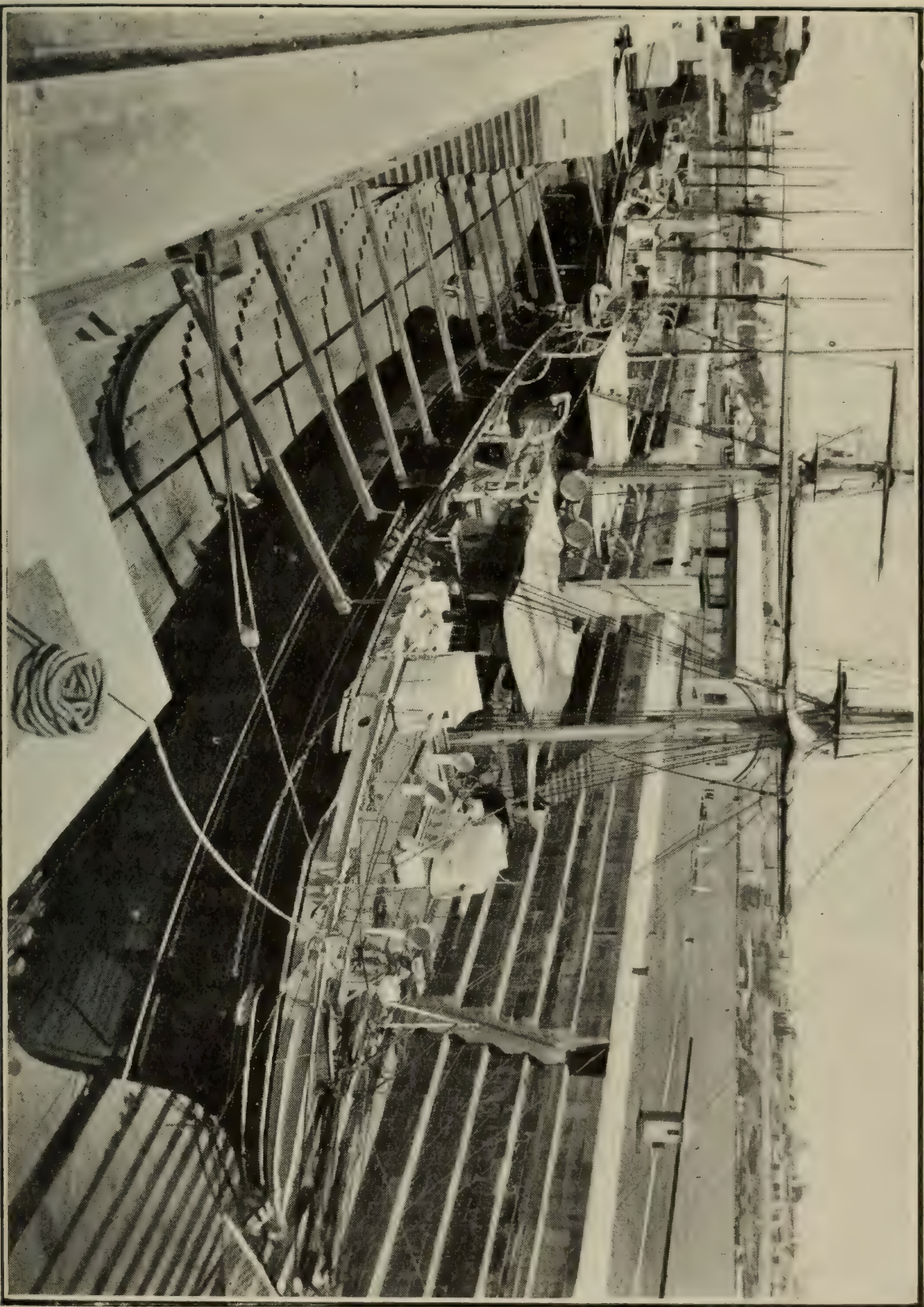
surrounding district is devoted to dairy-farming, fruit-growing, and agriculture.

BLACKTOWN, at the junction of the Great Western and Richmond Railway lines, 22 miles west of Sydney. Grapes, oranges, and other fruits are grown largely in the surrounding districts. The place takes its name from an institution founded there by Governor Macquarie for the education of aborigines.

RIVERSTONE, on the railway line midway between Blacktown and Windsor, is noted for its extensive meat works. Fruit-growing is also carried on in the neighbourhood.

WINDSOR, one of the oldest settled places in the State, is situated on the Blacktown-Richmond railway line, 34 miles from Sydney, and about ten miles above the head of navigation of the Hawkesbury. It was at one time the country seat of Governor Macquarie. The surrounding district is fertile, and is devoted mainly to dairying and agriculture. The town itself is on a hill, and is not much affected by the desolating floods that occasionally sweep over the surrounding district. A large bridge, built on iron cylinders, spans the Hawkesbury at Windsor, which also has tanneries, a butter factory, benevolent asylum, and a private observatory. *Wilberforce* and *Pitt Town* are townships near Windsor, in the midst of rich maize-growing lands, which yield sometimes as much as 100 bushels to the acre.

RICHMOND, four miles from Windsor, is the terminus of the Blacktown-Richmond railway. It is built within a short distance of the Hawkesbury River, and the surrounding district consists of rich agricultural land, yielding large quantities of oaten and lucerne hay, and heavy crops of maize. The Kurrajong Heights, a popular tourist resort and sanatorium, are distant about ten miles west of the town. Oranges and stone fruit are largely grown on the slopes of the Kurrajong Mountains. In the immediate neighbourhood of Richmond is the *Hawkesbury Agricultural College*, a flourishing Government educational institution, where young men wishing to become farmers are



SUTHERLAND DOCK—COCKATOO ISLAND.

trained on the most modern and scientific lines. In connection with the college is an extensive experimental farm.

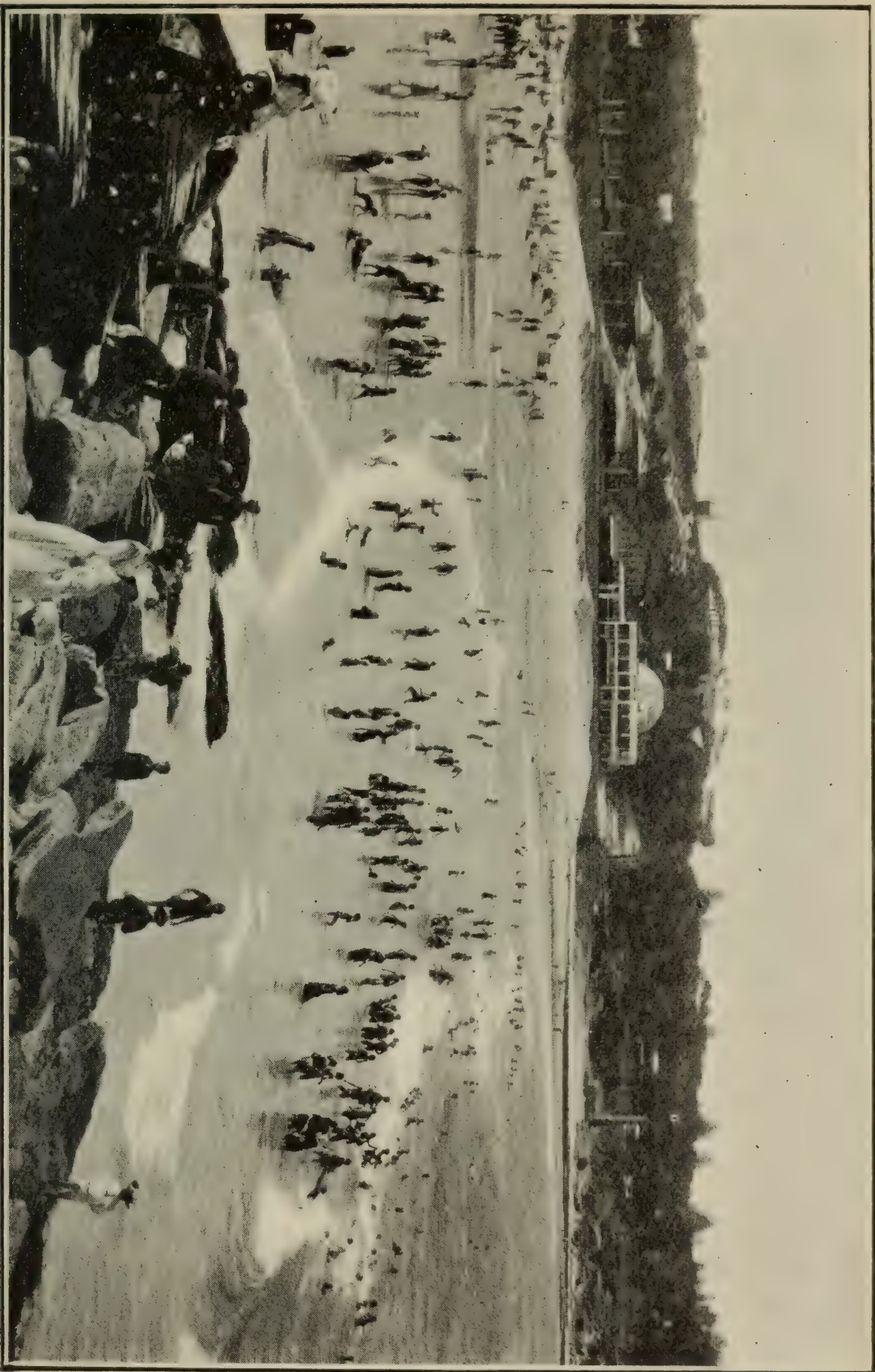
RYDE, on the north bank of the Parramatta River, eight miles north-west of Sydney, in a district celebrated for its oranges and stone fruits.

NORTH SYDNEY (formerly ST. LEONARDS) is a rapidly extending residential suburb on the northern shores of Port Jackson, opposite the Circular Quay, with which communication is maintained by a fleet of first-class ferry steamers. A railway line to *Hornsby*, on the Great Northern Line, commences at Milson's Point, and passes through a number of rapidly-growing townships. The chief of these settlements are *Chatswood*, *Pymble* and *Turramurra*. Electric tramways traverse North Sydney to *Willoughby*, *Mosman*, and *Longueville* (via Gore Hill). St. Leonards Park (a recreation ground, 40 acres in extent, on the heights in the middle of the town) is well known to many Sydney and suburban athletes. One of the many interesting sights of North Sydney is a large suspension bridge over a branch of Middle Harbour.

MANLY, the Brighton of New South Wales, and the leading surf-bathing resort in Australia. It stands upon and stretches inland from the isthmus connecting North Head with the mainland. It has a fine beach facing the ocean, and another on the harbour side, while two miles to the north is the favourite surfing resort of *Freshwater*. A road leads from Manly northwards to *Narrabeen* (on Narrabeen Lagoon), *Bayview* and *Newport*, on the Pittwater arm of Broken Bay.

GRANVILLE, at the junction of the Great Southern and Great Western Railway system, 13 miles from Sydney, has numerous manufactories, *e.g.*, pipe and tile works, Clyde Engineering Works, railway carriage works, tweed factory, plough factory, kerosene refinery, and numerous brickworks and tanneries.

ROCKDALE, ARNCLIFFE, KOGARAH, and HURSTVILLE are rapidly extending residential townships on the Illawarra



SURF-BATHING AT COOGEE.

railway line, all within a short distance of Sydney, and on the way to the National Park and the Illawarra and South Coast tourist districts.

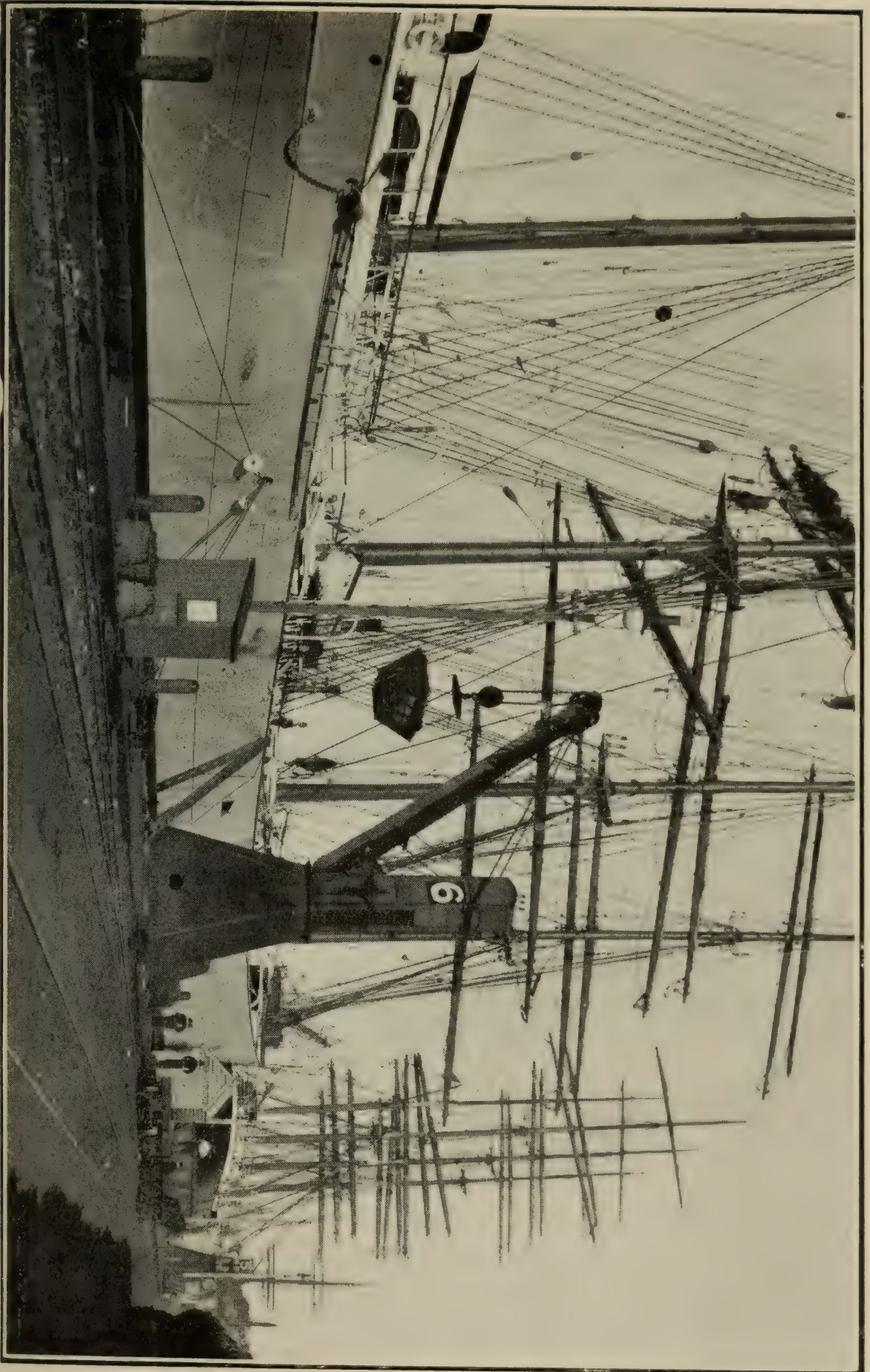
(b) IN THE BRISBANE WATER DISTRICT.

GOSFORD is situated on the northern shore of Brisbane Water, an arm of Broken Bay, the estuary of the Hawkesbury. It is also an important railway station on the Great Northern Line, and the centre of a timber and fruit-producing district. For sportsmen there is abundant fishing and shooting within easy reach of the town.

(c) IN THE HUNTER RIVER DISTRICT.

NEWCASTLE, the great coal emporium of Australia, stands on the southern shores of the estuary of the Hunter. It is distant 102 miles by railway from Sydney, and is the second seaport of the State. The depth of the water alongside the wharves is about 23 feet, and varies from 27 feet to 30 feet in mid-stream. The mouth of the Hunter was discovered by Lieutenant Shortland on September 16th, 1797, when on an expedition to Port Stephens in pursuit of runaway convicts. He called the stream Coal River, but afterwards, in honour of Governor Hunter, it received the name it now bears. The harbour has, by artificial means, been rendered commodious and secure; but, notwithstanding the erection of the southern breakwater, the entrance to the port is still dangerous during south-east gales. Powerful dredges are continually at work deepening and clearing the channels and wharf frontages. Commodious wharves, provided with hydraulic cranes, line the shores. Manufactories include boot, cordial, carriage and biscuit factories, shipbuilding and fellmongery yards, a brewery, foundries, smelting and engineering establishments. Steps are being taken for establishing at Port Waratah, a short distance up stream, an extensive steel manufactory by the Broken Hill Proprietary Company, who propose, it is said, to spend several millions sterling in the enterprise. The iron ore to be treated at these works will be

LOADING COAL AT NEWCASTLE.



obtained from the Iron Knob and Iron Monarch deposits in South Australia, which are described as among the richest and most extensive in the world. Nearly all the produce of the Hunter River valley, together with a great portion of that of the Northern Tableland and the Liverpool Plains, is sent by rail to Newcastle for shipment. The principal articles of export are coal, wool, frozen meat, tallow, and farm produce. The yearly output of coal alone is nearly three million tons, and it is said that the appliances for its shipment at Newcastle are unsurpassed at any coaling station in the world. The coal is shipped for the most part from "The Dyke," on Bullock Island, and a row of powerful arc lamps illuminates the wharves, so that work may be carried on without intermission throughout the night. The city proper is built upon and at the foot of a hill, which rises abruptly from the Harbour. The streets are well paved, and are lighted with electricity. Newcastle is surrounded by populous mining townships, most of which are connected by tramway with the city. The chief of these are *Stockton*, *Hamilton*, *Lambton*, *Wallsend-Plattsburg*, *Merewether*, *Tighe's Hill*, *Wickham*, *Mayfield* and *Waratah*. A lighthouse with fixed white light, is erected on Nobbys, and a red light is fixed at the end of the southern breakwater. Fort Scratchley protects the entrance to the harbour. Newcastle has abundant facilities for surfing, bathing and boating. From the Newcastle Park, on the top of Monument Hill, may be obtained magnificent views of the coast line and of the Hunter for many miles.

WEST MAITLAND, a place of considerable trade, is situated on the Great Northern Railway, 20 miles from Newcastle, in the midst of rich agricultural lands. The town is built on the banks of the Hunter, and High-street, its main thoroughfare, follows the windings of the stream. The bed of the river is little below the level of the town and of the surrounding country, and destructive floods have inundated both. In March, 1893, a flood covered the greater part of the town to the depth of 12 feet, and

converted the whole of the low-lying region between Maitland and Newcastle into a vast inland sea. Strong embankments, erected at a cost of £30,000, line the river banks alongside the town. Lucerne, maize, grapes, oats, potatoes, pumpkins and melons are the chief agricultural products of the surrounding district; and lying to the south of the town, and connected with it by rail, is the marvellously rich and extensive South Maitland coalfield. The manufacturing establishments include gas and ice works, coach, boot, and tobacco factories, extensive wool-scouring works, and a brewery. West Maitland possesses a cathedral, numerous churches and schools, a hospital, benevolent asylum, and school of arts. Large and elaborately-equipped sheep and cattle saleyards are erected at Campbell's Hill, adjoining the town, where almost all the stock required for consumption by the inhabitants of the lower Hunter Valley are sold by auction. At *Walka*, close to West Maitland, are the waterworks for the district. One feature of this water scheme is an artificial lake, to be pumped full when the river is clear, so that when a freshet fills the Hunter with turbid water, the supply for the filtration beds may be drawn from this reserve store.

KURRI KURRI and CESSNOCK (each with a population of many thousands) are important mining towns and business centres in the South Maitland coalfields; with well laid-out streets, comfortable cottages, palatial business places, churches, schools, hospital, and other public buildings, and an excellent water supply. The smaller towns in this field are—*Pelaw Main*, *Weston*, *Abermain*, *Stanford-Merthyr*, *Heddon Greta* and *East Greta*. Besides being the largest coalfield in the State, the South Maitland field yields large quantities of timber, while in the surrounding districts—chiefly around *Ellalong* and *Wollombi*—large areas are devoted to dairying, fruit and wine-growing. In the neighbourhood of *Mount View*, three miles from Cessnock, much attention is given to the growing of grain and vegetables.

EAST MAITLAND is separated from West Maitland by

Wallis Creek, and is, for the most part, built on higher ground. Like West Maitland, it is surrounded by rich agricultural lands, but its population and trade are not nearly so great. It is connected by tramway with West Maitland, and the railway passes through the town. The chief public buildings are a large gaol, courthouse, post office, mechanics' institute, lands and roads offices, public high school for boys, and several churches and schools.

MORPETH is situated at the head of the navigation of the Hunter, 30 miles from Newcastle, and about half a mile above *Hinton*, a township at the junction of the Paterson and the Hunter. A branch railway line connects Morpeth with East Maitland, four miles distant. In the surrounding district dairying is carried on, and besides butter, its chief products are lucerne, maize, millet, potatoes, melons and pumpkins. Vessels of 800 tons trade regularly with Sydney.

BRANXTON is about 35 miles west of Newcastle, and within half a mile of the Great Northern Railway. The district is principally occupied by farmers, graziers, and vigneron.

LOCHINVAR is near the Great Northern Railway, 26 miles west of Newcastle. The Hunter River runs close by, and the surrounding lands yield large quantities of agricultural produce. There are several large vineyards close to the town.

GRETA, a coal-mining township, on the Great Northern Railway, 32 miles from Newcastle. The Greta coal is held in high repute for gas-making. There are several vineyards within the district.

SINGLETON is situated on the banks of the Hunter, and is a station on the Great Northern Railway, 49 miles from Newcastle. It is the centre of a rich dairy-farming and agricultural district, and is liable to occasional floods. The level country close to the town is called Patrick's Plains, so named by the first explorers of the Hunter River Valley, John Howe and Benjamin Singleton, who pitched their camp there on St. Patrick's Day, 1825. Dairy-farming is

a thriving industry, and there are a few small collieries in the district, the chief of which is at Rix's Creek. The Singleton Show is held annually under the auspices of the Northern Agricultural Association, one of the most flourishing of its kind in the State.

DENMAN stands on the Hunter, about three miles above its junction with the Goulburn, in the midst of rich alluvial flats devoted to dairying, stock raising and agriculture and farming.

MUSWELLBROOK is situated on the left bank of the Upper Hunter, 76 miles from Newcastle. The Great Northern Railway passes through the town. The surrounding district is chiefly agricultural, wheat and maize being largely raised, and during recent years dairying has made great strides. The vine and tobacco are grown to a limited extent, and grazing also receives attention. There are two butter factories in the town.

ABERDEEN, on the east bank of the Upper Hunter, is a railway station nearly mid-way between Muswellbrook and Scone, and the seat of extensive meat chilling and freezing works, one of the largest and best equipped in the State. The surrounding district is pastoral and agricultural.

SCONE, surrounded by mountains and prettily situated on the Kingdon Ponds, a tributary of the Hunter, is a station on the Great Northern Railway, 95 miles from Newcastle. Wheat, maize, and tobacco are grown in the district, and dairying is also carried on. The wild and picturesque scenery of the Flat Rock district, about a mile from the town, is highly spoken of. About 10 miles north of Scone is *Mount Wingen*, whose continually burning coal beds are a source of attraction to tourists.

MURRURUNDI, on the Page River, a tributary of the Hunter is a railway station on the Great Northern Line. The town is situated at the foot of the Liverpool Range, at an elevation of 1,546 feet above sea-level. A few miles from the town the Liverpool Range is pierced by a railway tunnel 528 yards long, which opens on the other side of the

range, into the Liverpool Plains district at Ardglen. The surrounding district is mainly pastoral.

MERRIWA, on the Merriwa Creek, a tributary of the Goulburn, is surrounded by good pastoral country. The district is noted for its merino sheep, and some of our best timbers flourish in the surrounding district. Climate and soil encourage the growth of wheat and other cereals, and heavy crops of potatoes and grapes are produced, while maize is also largely grown.

CASSILIS, on the Munmurray River, is within eight miles of the Dividing Range, and 76 miles from Muswellbrook. The district is well watered, and is purely a pastoral one.

PATERSON, situated at the head of navigation of the Paterson River, a tributary of the Hunter, is in the midst of good dairying, stock-raising, and fruit-growing country. The chief crops are potatoes, maize, broom-millet, lucerne, oranges, grapes and tobacco. Dairying is also largely carried on. Large willows, planted originally to prevent the erosion of the river banks during floods and freshets, line both sides of the Paterson for many miles between the township and Maitland. They are said to have been grown from cuttings taken from the willows over the grave of Napoleon at St. Helena.

RAYMOND TERRACE is prettily situated on a gentle slope on the east bank of the Hunter River, near its junction with the Williams. It is within six miles of Hexham, on the Great Northern Line, and has water communications with Newcastle and Sydney. The surrounding district is agricultural, lucerne, maize, onions, and broom-millet being the chief crops. There are also several vineyards within a few miles of the town, as well as an extensive Government Viticultural Station, where phylloxera resisting vines are raised for distribution among the vine growers of the State. Dairying is also largely carried on.

CLARENCE TOWN, at the head of the navigation of the Williams River, is distant about 20 miles from Maitland. It is the centre of an agricultural and dairying district, the

alluvial flats along the river banks yielding heavy crops of maize.

DUNGOG, about 30 miles north of Maitland, is situated on the Williams River above Clarence Town, and is a thriving business centre on the North Coast Railway. Agriculture and dairy-farming are carried on in the surrounding district, which also produces wine, maize, and arrowroot.

WOLLOMBI (on the Wollombi Brook) and GRESFORD (on the Paterson) are other townships of growing importance in the Valley of the Hunter.

(d) IN THE COUNTY OF GLOUCESTER.

STROUD, "the home of saw mills," is situated a short distance from the Karuah River, and 32 miles north of Raymond Terrace, in a dairy-farming and stock-raising district. Maize is largely grown, and the abundant timber supplies employ numerous mills. GLOUCESTER lies further north, while in the Copeland goldfield, in the north-western part of the district are the townships of COPELAND NORTH and BARRINGTON.

BULLADELAH is situated at the foot of a mountain of alum-stone, at the head of the navigation of the Myall River, which flows into Port Stephens. Alum-stone, yielding about 80 per cent. of pure alum, occurs in a large deposit near the township, and is shipped in large quantities to England. Timber is also obtained to a limited extent.

FORSTER is a township on Wallis Lake (at the point of entrance to the Wallomba River). It is a bar-harbour, and lies a little to the north of Cape Hawke. The chief products of the district are fish and timber.

(e) IN THE MANNING RIVER DISTRICT.

TAREE is situated on the north bank of the Manning about 20 miles from the sea, and four miles from the Dawson junction. The soil on the banks of the river is deep and fertile, and maize potatoes, and oranges are grown. Dairy-farming is, however, by far the most important

industry. Marble from this district is sent to the Cockle Creek Smelting Works (near Newcastle), for fluxing purposes. Steamers ply regularly between Taree and Sydney.

WINGHAM is at the head of the navigation of the Manning, eight miles above Taree, and is the outlet for the produce of the Upper Manning and its numerous tributary creeks. The industries of the neighbourhood are dairy-farming, maize-growing and timber-getting. The State Government limeworks are also in operation.

CUNDLETOWN is situated on the north bank of the Manning, four miles below Taree. The neighbouring lands are well suited for dairying.

CROKI, on the north bank of the Manning, eight miles from Harrington Inlet, is an oyster emporium, and an important local shipping place.

TINONEE, on the south bank of the Manning, is a small town.

(f) IN THE HASTINGS RIVER DISTRICT.

PORT MACQUARIE—one of the oldest country towns in the State, being settled in 1820—is picturesquely situated on a promontory at the mouth of the Hastings. The navigation of the harbour is hindered by a bar; but vessels of small tonnage trade to Sydney. Maize, butter, and potatoes are the chief products of the surrounding agricultural district. A large trade in timber is also carried on. Small craft trade up the river for 20 miles, and bring produce to the town for shipment.

WAUCHOPE is a small township on the Hastings River, 14 miles above Port Macquarie. Produce is conveyed by drogher to Port Macquarie, and thence to Sydney. Timber-getting is the principal industry, but dairying is also carried on.

(g) IN THE MACLEAY RIVER DISTRICT.

KEMPSEY, the most important town in the Macleay district, consists really of three parts—East, West, and Central Kempsey—the last being the chief seat of business.

The town is situated in a bend of the river about 30 miles from the Macleay Heads, and has steamer communication with Sydney. The surrounding district is very fertile. Maize, butter, and pigs are its chief products. Dairy-farming is extensively carried on, and several creameries are in operation.

FREDERICKTON is situated at the junction of Christmas Creek with the Macleay River, four miles from Kempsey. Dairying and timber-getting are the chief industries of the surrounding district.

GLADSTONE stands at the junction of the Belmore and Macleay Rivers. Butter and maize are its principal products.

SEVEN OAKS and SHERWOOD are other small townships on the Macleay.

NAMBUCCA, on the river of the same name, and BELLINGEN and FERNMOUNT, on the Bellinger River, have communication by means of small vessels with Sydney, and export timber and dairy produce.

(h) IN THE CLARENCE RIVER DISTRICT.

GRAFTON is a place of considerable trade on the Clarence River, about 45 miles from the sea, and accessible for steamers drawing 11 feet of water. It has railway connection with the Richmond-Tweed district, and the line is at present in course of construction south to Glenreagh. The city is divided into two parts—North and South Grafton—by the river, which is there half a mile wide. Steam ferries ply from North Grafton to South Grafton, Ulmarra and Clarenza. Grafton is well laid out; its main streets are very wide and are planted with trees, while the cross streets run at right angles with them. The alluvial lowlands of the surrounding district are among the richest in the State, and yield large quantities of maize, sugar cane, potatoes and oranges. Of late years dairying, however, has become the leading industry. The industries of the city comprise saw mills, tanneries, soap and candle

works, gasworks, iceworks, butter factory, and an extensive bacon-curing establishment; while for five months of the year the numerous sugar mills in the Lower Clarence are busily engaged crushing sugar cane. At RAMORNIE, nine miles from Grafton, the Australian Meat Works, one of the largest of the kind in Australia, are in operation. Coal of inferior quality and of little value commercially exists throughout the district, and gold-mining operations are carried on in several parts of the Upper Clarence Valley. Considerable trade is carried on by rail with the Richmond and Tweed districts, and by means of teams with Glen Innes, 110 miles distant. About 30 miles from Grafton is the copper mining centre of *Cangai*, a place of industrial importance.

COPMANHURST is situated at the head of the tidal waters of the Clarence, about 20 miles above Grafton. The industries are agricultural, pastoral, and mining. Steam river boats carry on the trade between Copmanhurst and Grafton.

MACLEAN (formerly *Rocky Mouth*) stands on the Clarence, at the junction of the North and South Arms with the main river, 18 miles from the ocean. It is a port for the shipment of butter and agricultural produce. Several passenger steamers ply daily to Grafton, 30 miles further up the river.

ULMARRA, on the Clarence River, nine miles north-east of Grafton, is surrounded by rich dairying and maize-producing lands, and contains the largest creamery in the district.

LAWRENCE is situated nine miles above Maclean, at a point on the Clarence called the Elbow. It is a shipping port for the dairy and agricultural products of the neighbouring alluvial lands.

BRUSHGROVE (on Woodford Island), NYMBOIDA (on Nymboida River), ILUKA (on the north head of the Clarence River entrance), and YAMBA (a seaside resort at the south side of the Clarence River entrance), are small townships in the district.

(i) IN THE RICHMOND RIVER DISTRICT.

LISMORE stands at the head of the North Arm of the Richmond, at the junction of the Leicester and Wilson's Creeks. Sea-going steamers trade to the town, which is 22 miles by land and 65 miles by water, west from Ballina. Numerous small steamers are engaged in the river trade. The surrounding district is almost wholly devoted to dairy-farming. Coal of good quality occurs in the district, but at places too remote from a market to be worked with profit. A railway line connects Lismore, *via* Byron Bay, with Murwillumbah, on the Tweed; another line runs north to KYOGLE, while still another runs south to Grafton on the Clarence, whence it is now being constructed further on to Glenreagh. Sugar cane is grown in diminishing quantities in some parts of the district around Lismore, and is carried in punts to the mills at Broadwater to be crushed. Butter factories, supplied by numerous separating stations throughout the district, are in operation, and large quantities of butter made here are exported to the English market. A Government experimental farm is situated at Wollongbar, eight miles from Lismore.

CASINO stands on the Main Arm of the Richmond, 40 miles above its junction with the North Arm, and 90 miles from Ballina by water. A costly high-level bridge spans the river at Casino, and there are large squatting stations and sugar plantations within a short distance of the town. The industries comprise dairy-farming, sugar-growing and timber-getting, splendid hardwood, as well as pine, being largely exported. Besides being an important railway town, Casino is situated about a mile above the head of the river navigation.

KYOGLE, 18 miles north of Casino by rail, is the thriving centre of a rich dairying district. The country around Kyogle consists of deep black loam river flats, with higher ground composed of rich chocolate soil of volcanic origin, and clothed with luxuriant grasses to the summits of the ridges. Besides butter, the Kyogle district produces

lucerne, maize, potatoes and timber (teak, pine, cedar, beech and rosewood).

CORAKI is 14 miles from Lismore, and 18 miles from Casino, by land, and stands at the junction of the Main and North Arms of the Richmond. It is the chief shipping depot in the district, the Casino and New England cargo being discharged here for transhipment by drogher to Casino. The main industries of the surrounding district are dairying and sugar-growing.

BALLINA stands at the north side of the entrance to the Richmond River, and has daily communication by steamer with Lismore. The rainfall at Ballina—72 inches annually—is among the highest in the State. Dairy-farming and the growing of sugar cane are extensively carried on in the district, and payable gold is obtained on the beaches north and south of the town. The finest cane grown in the “Big Scrub” country is produced at Teven Creek and Tintenbar, in the neighbourhood of Ballina.

WOODBURN is on the Richmond, below the South Arm junction and in the heart of a dairy-farming and sugar-growing district.

WARDELL (on the Richmond, 10 miles above Ballina), BROADWATER (between Woodburn and Wardell, and the site of the Colonial Sugar Company's mill), WYRALLAH and the great dairying seats of BANGALOW and ALSTONVILLE are the chief remaining centres of settlement in the Richmond district.

(j) IN THE TWEED RIVER DISTRICT.

MURWILLUMBAH, situated on the Tweed River is the terminus of the Tweed-Lismore Railway, and the centre of a thriving dairy-farming district. It has occasional communication with Sydney by means of small steamers and sailing vessels. Sugar cane is grown in the surrounding district, and several costly and well-equipped mills have been erected for cane-crushing. An extensive timber trade is also carried on.

TWEED HEADS, just south of Point Danger, is a favourite and flourishing watering place. It is full of boarding houses and hotels, and is thronged in summer with tourists in quest of surfing, fishing and fine river and coastal scenery. River steamers ply regularly between Tweed Heads and Murwillumbah.

TUMBULGUM (meeting of the waters), a small village at the junction of the two arms of the Tweed, has communication with Murwillumbah and Tweed Heads by means of a steam launch.

BYRON BAY, on the Tweed-Lismore Railway, 32 miles from Murwillumbah, is adjacent to Cape Byron. It is the port for the trade of the Tweed, and boasts of the largest and best equipped butter factory in Australia. This factory belongs to the North Coast Co-operative Company, which commenced operations by treating 29 cans of cream. Now the yearly turnover amounts to over half a million pounds sterling, while the total turnover up to the end of 1911, was five millions pounds sterling. Butter is shipped from Byron Bay not only to Sydney and Brisbane, but also to England, Western Australia, and South Africa.

(k) IN THE ILLAWARRA DISTRICT.

WOLLONGONG ranks as the third sea-port of the State. It is situated on the South Coast, 48 miles from Sydney, and the Illawarra Railway passes it. The town is well built, and the harbour (Belmore Basin) is three acres in extent, and excavated out of the solid rock to the depth of 18 feet at low water. The chief exports from Wollongong are coal, coke, and dairy produce. The surrounding district is one of the chief localities whence the metropolis is supplied with milk. Coal is raised at Mount Kembla, Mount Keira, Mount Pleasant, and Broker's Nose in the Illawarra Range, a few miles west of the town, and conveyed to port by private railway lines. As already stated, the first discovery of coal in the State was made at Mount Keira in 1797, by Clark, the supercargo of the "Sydney Cove," while on his way overland to Sydney after the

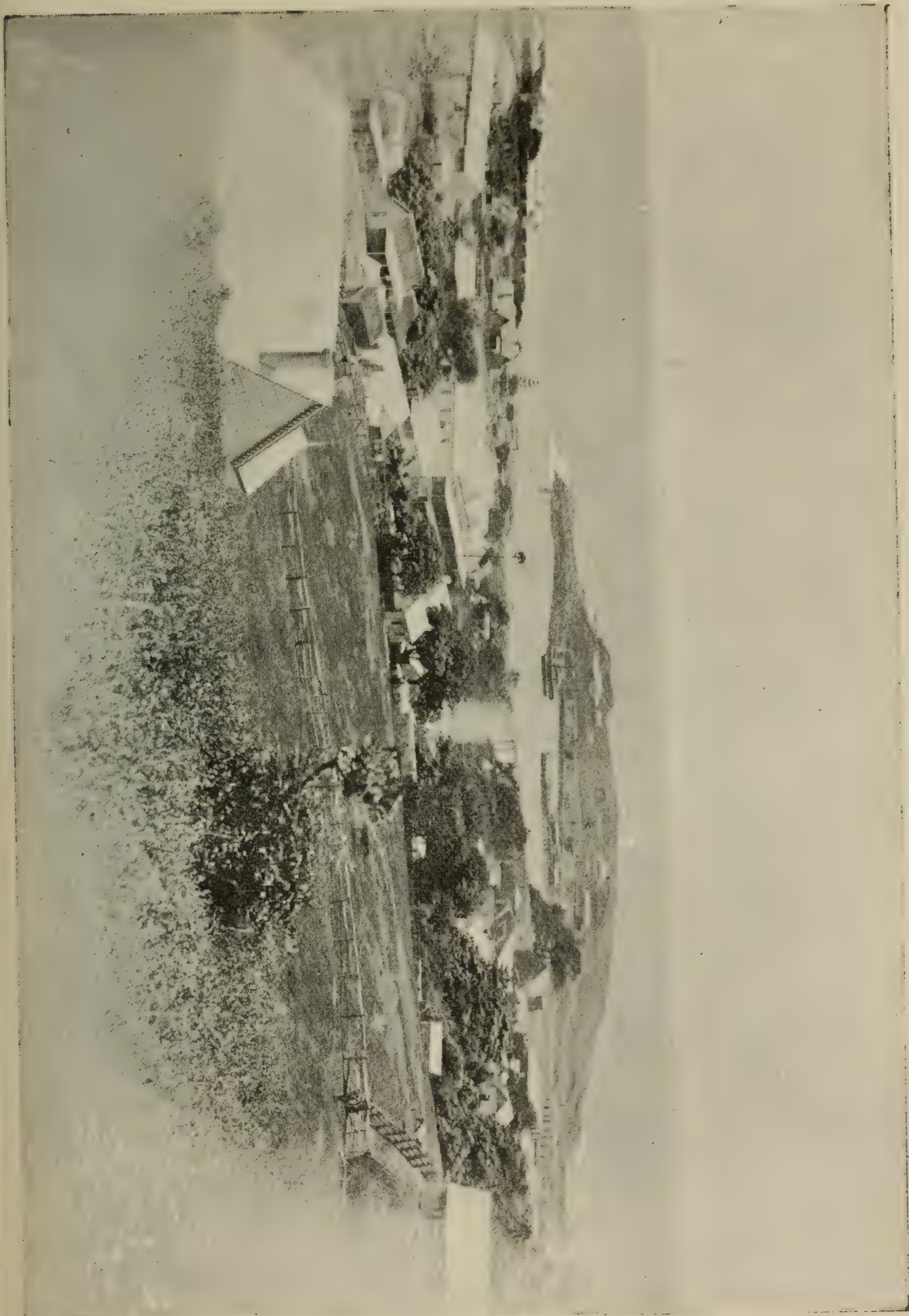
wreck of that vessel in Bass Strait. Wollongong is a favourite watering place, and tourists are loud in their praises of the beautiful mountain and ocean scenery within easy reach of the town, and of its splendid facilities for surf bathing. The harbour is provided with a breakwater and lighthouse, and is easy of entrance, except during southerly and easterly gales. Fortifications are erected on the two hills which command the entrance to the port.

PORT KEMBLA is a thriving town a few miles along the coast south of Wollongong. Extensive harbour works have been carried out here during recent years, with the result that Port Kembla has been made suitable for shipping during almost all weathers. Besides being a busy coal port, it is also the site of an extensive and up-to-date electrolytic and smelting works, the copper from which has acquired a world-wide reputation for purity. Gold, silver, and copper ores are brought to Port Kembla for treatment from various parts of New South Wales and the other States of the Commonwealth (*e.g.*, from the Mount Morgan mines in Queensland).

HELENSBURGH, CLIFTON, BULLI, WOONONA, BELLAMBI and CORRIMAL are populous and busy coal-mining townships, a few miles north of Wollongong. Helensburgh coal is trucked to Sydney for shipment. Clifton is prettily situated on a cliff overlooking the ocean, and Bulli is within about three miles of the famous Bulli Pass. The Bulli, Woonona and South Bulli (Bellambi) Coal Companies have each erected on the coast substantial jetties, with railways leading thereto for the shipment of coal. Helensburgh is the northernmost of all the South Coast Collieries.

THIRROUL and STANWELL PARK, near the northern end of Illawarra, are favourite holiday resorts with admirable facilities for surf bathing.

UNANDERRA (the seat of a large coke manufactory on the railway line four miles south of Wollongong); DAPTO (near the western extremity of Lake Illawarra, nine miles south of Wollongong, in the heart of a rich dairy-farming district); ALBION PARK (five miles further south, close to



Lake Illawarra, and surrounded by dairy-farming lands), and SHELLHARBOUR (a small seaport a little to the south of Lake Illawarra), are the chief centres of population between Wollongong and Kiama.

KIAMA, "noted for its beauty, its butter, its basalt, and its Blow Hole," is a small port a little over 20 miles south of Wollongong, and an important station on the South Coast Railway. The surrounding district is devoted to dairying, and is one of the chief sources of the metropolitan butter and bacon supplies. The Bombo blue metal quarries are close to the town, and furnish employment for a large number of men. One of the sights of Kiama is the Blow Hole, a natural cavern in a basaltic cliff, through which the sea water is violently thrown as spray to a considerable height during rough south-easterly weather. This wonderful natural phenomenon, which was discovered by Bass in 1797, is situated on the promontory which shelters the harbour on the south side, and on which a lighthouse is built. Kiama is a favourite holiday and tourist resort.

GERRINGONG (a railway station and small seaport on the coast, six miles south of Kiama, and JAMBEROO (on the Minnamurra Creek, seven miles west of Kiama, and three miles distant from the well-known "Whispering Gully," one of the natural wonders of Illawarra), are thriving townships in dairy-farming districts.

(1) IN THE SHOALHAVEN DISTRICT.

NOWRA, the chief town of this district, is situated on the south bank of the Shoalhaven, directly opposite Bomaderry, the present terminus of the South Coast Railway. It is 92 miles from Sydney, and 10 miles from Greenwell Point, the seaport of the Shoalhaven. One of the longest bridges in the State spans the river close to the town, and the rich pastoral and agricultural lands in the surrounding district are devoted to dairy-farming and the growing of oats, lucerne, millet and potatoes. The Cambewarra Mountain (2,044 feet), from the fern-clad slopes of which, magnificent views (including that of Jervis Bay) are

BRIDGE SPANNING THE SHOALHAVEN AT NOWRA.



obtained, is within an hour's drive of the town. Cambewarra, Kangaroo Valley, Greenwell Point, and some other small townships are within easy reach of Nowra.

BERRY, on Broughton Creek, a tributary of the Shoalhaven, is a station on the railway line, eight miles north of Nowra. The town is prettily situated, within a short distance of the base of rugged ranges over 1,000 feet high, whose slopes are devoted chiefly to the growth of maize and other cereals. On the low-lying lands in the district also there are numerous farms. The staple industry of the district is dairy-farming.

GREENWELL POINT (on Crookhaven), NUMBA (on the Shoalhaven), TERRARA (between Nowra and Numba), KANGAROO VALLEY (a favourite tourist resort, between Moss Vale and Nowra), and CAMBEWARRA (at the foot of the Cambewarra Mountain), are amongst the remaining townships in the Shoalhaven district.

(m) SOUTH OF THE SHOALHAVEN RIVER.

MILTON is a township in the heart of a dairy-farming district. It is four miles from the port of Ulladulla, and 48 miles south of Nowra, within three miles of Lake Burrill, and 12 miles east of the Pigeon House.

ULLADULLA, the port of a dairy-farming district, is 18 miles south of Jervis Bay. The harbour, although small, is one of the safest on the coast, being protected on three sides by high land, with rocky bluffs at the entrance. The exports are dairy produce and timber.

KIOLA is a thriving timber settlement on the coast, midway between Ulladulla and Bateman's Bay, sleepers, girders, and piles being sent away in large quantities, and not far from Kiola are the growing sawmill centres of *Brawley's Point*, *Cockerby Creek*, and *Pebbly Beach*.

NELLIGEN, a small town situated on the western side of the Clyde River, 10 miles north-west of Bateman Bay township. It is the outlet by sea for much of the produce of the Braidwood district, and is in a dairying and agricultural district. One of its interesting industries is a

large spoke, felloe and hub factory. The oysters from the Clyde River stand in high favour in the Sydney market.

BATEMAN BAY, a small seaport near the entrance of the Clyde River into Bateman Bay. It is 20 miles north of Moruya, and exports timber, oysters, wattle bark and fish to the metropolitan market. Between Bateman Bay and Moruya is the thriving timber settlement of Moco, not far from the coast.

MORUYA, on the Moruya River, four miles from its mouth, is the port of a dairy-farming district, possessing butter, cheese, and bacon factories, and flour and saw mills. The rich alluvial Moruya flats yield large crops of maize, wheat, oats, and potatoes, and the gold and silver mines of the district have been profitably worked. Moruya granite is shipped to Sydney and elsewhere for building purposes.

BODALLA, on the Tuross River, is the centre of a dairy-farming district. Bodalla is noted throughout Australia for its cheese. Half a century ago the late T. S. Mort (a statute to whose memory stands in Macquarie Place, Sydney), acquired 30,000 acres of rather low quality land in this district, and expended a large amount of capital in establishing a dairy-farming industry on the most approved scientific system. This venture proved a pronounced success. Hundreds of tons of cheese are now exported every year from Bodalla, while pigs are bred and fattened in thousands for the Australian and oversea markets.

COBARGO stands at the junction of the Wandella and Murrabrine Creeks, between Moruya and Bega. The surrounding district is devoted to dairy-farming, and Bermagui, 12 miles distant, is its seaport.

BEGA, at the junction of the Bemboka and Brogo Rivers, whose united waters form the Bega River, is surrounded by a fertile district, in which dairy-farming is extensively carried on. Creameries, butter, coach and boot factories, saw mills and tanneries are in operation in and near the town. The seaport is Tathra, 12 miles distant, at the mouth of the Bega River.

CANDELO, 15 miles south-west of Bega, on Candelo Creek.

is surrounded by an important dairying district. Tathra and Merimbula are its ports.

MERIMBULA, on Merimbula Lake, 16 miles south of Bega, is a seaport for the shipment of much of the produce (horses, cattle and sheep) of the Monaro district.

PAMBULA is situated on the Pambula River, four miles from Merimbula. Dairy-farming and gold-mining are the chief industries of the district.

EDEN is distant 35 miles from Cape Howe, and stands on the northern shore of Twofold Bay, which for size and security is almost equal to Port Jackson. The surrounding district is rugged, and devoted to the raising of cattle, horses and sheep. Steamers convey much of the produce of the district to Sydney, while live stock is sent to Tasmania and pigs to Melbourne. Whaling (confined to the bay chiefly) is carried on principally in open boats.

WYNDHAM, on the road from Merimbula to the Monaro district, is situated in a mining, agricultural, and dairy-farming district.

TOWNS ON THE NORTHERN TABLELAND.

TENTERFIELD, situated on Tenterfield Creek, within 10 miles of the Queensland border, and surrounded by lofty granite hills, is a station on the Great Northern Railway, and the chief town of an agricultural and dairy-farming and tin-mining country. Within a radius of little over 25 miles from the town are included the Timbarra, Drake, Poverty Point, Boonoo Boonoo and other diggings—gold, silver and tin occurring in payable quantities about the river beds and mountain spurs. Wheat is the principal crop raised, and beetroot has been grown, but dairying promises to be the most important industry of the district. Tenterfield stands at an elevation of about 3,000 feet above sea-level, and its bracing climate proves attractive to Queensland residents in search of a sanatorium.

DRAKE, distant 32 miles from Tenterfield, on the road to the Clarence and Richmond River districts, is within

easy reach of the Timbarra goldfield, and is the centre of a region rich in minerals.

EMMAVILLE (17 miles from Deepwater, a railway village whence the output of the Emmaville and other adjacent mining fields is despatched to market), is the centre of the Vegetable Creek tin-mining field. Silver is also raised in the surrounding district. The district possesses good agricultural land and several large sheep stations.

GLEN INNES, which takes its name from Major Innes, one of the oldest of the New England settlers, is a station on the Northern Line, pleasantly situated on the Rocky Ponds, four miles from the Beardy River. The surrounding district is, in the main, agricultural, producing wheat and other cereals; but sheep-farming is also largely engaged in, as also is dairying, as well as fruit-growing. It is within 28 miles of Emmaville (formerly Vegetable Creek). Glen Innes has communication by motor car with Inverell and Grafton.

INVERELL, on the Macintyre River, 40 miles west of Glen Innes, is surrounded by an extensive agricultural and squatting district, possessing fertile soil, well suited for the growth of cereals and the vine. Diamond-mining is carried on within a few miles of the town.

TINGHA, a township on Cope's Creek, a tributary of the Gwydir, is the centre of a tin-bearing region.

ARMIDALE, on the Dumaresq Creek, is the most important trade centre on the Northern Tableland. The Great Northern Railway passes through the town, which nestles among lofty hills, is substantially built, and enjoys a splendid summer climate. The industries of the surrounding district are chiefly dairying, squatting, and the growing of grain and fruit, while antimony in large quantities is raised at Hillgrove, 20 miles distant, and payable gold is met with in several parts of the district.

DORRIGO, near the eastern edge of the tableland, and about directly east of Armidale, is the centre of a rapidly growing dairying and fruit raising district. Almost the

whole trade of the Dorrigo district passes through Coff's Harbour.

HILLGROVE, a thriving mining township, 20 miles east of Armidale, is surrounded by a gold and antimony-producing district. The town possesses an excellent water supply, and water-power and electricity are in use in the mines. The mines are situated in a rugged and precipitous gorge, and "few visitors will escape the tingling sensation of a thrill when, seated in a truck of a cable tram, they slide over the edge of the hill and perceive the mine buildings almost 2,000 feet below their boot-soles."

BARRABA, on the Manilla River, 56 miles from Tamworth, is surrounded by a farming and squatting district. Wheat is the principal crop, and gold-mining is carried on in the alluvial and quartz diggings of the district.

URALLA, situated on the Rocky River, is a station on the Northern Line, 3,335 feet above sea-level, and surrounded by an important wheat-growing, pastoral, and gold-mining district.

WALCHA, on the Apsley River, 12 miles from the Great Northern Railway, is in the midst of a district where sheep and cattle raising, wheat-growing, dairying, and gold-mining are carried on. About 16 miles to the south-east of Walcha are Apsley Falls, which are to be reckoned amongst the finest waterfalls of the State. Farther to the east and across the Dividing Range is the extensive cattle raising district of YARROWITCH, whence also the main timber supplies for most of the New England settlements have to be obtained.

WERRIS CREEK, a station on the Northern Railway, at which the line to Moree branches off. Squatting and wheat-growing are the chief industries in the surrounding district.

BINGARA, on the Gwydir River, is noted for its diamond fields, which yield gems small in size, and faulty in colour. Several goldfields are within a few miles of the town, and wheat-growing and sheep-farming are largely carried on.

BENDEMEER, a small gold-mining township on the Mulnerindi River, 45 miles from Armidale.

MANILLA, a township at the junction of the Namoi and the Manilla Rivers, is a flourishing wheat and tobacco growing centre.

TOWNS ON THE SOUTHERN TABLELAND.

(a) IN THE UPPER HAWKESBURY BASIN.

GOULBURN, an important city, and one of the chief trade centres of the Southern Tableland, stands near the junction of the Mulwarree Ponds and the Wollondilly River. It is the principal station on the Great Southern Railway, and is also the junction of the branch line to Cooma. The city is tastefully laid out in broad streets, lighted with gas, and has several fine public buildings. Good agricultural land is met with throughout the district, and the cultivation of cereals, dairy-farming, and fruit-growing are the chief industries. The manufactories of the city proper comprise tanneries, coach, boot and shoe factories, flour and sawmills, and breweries. Goulburn is noted as a favourite summer sanatorium and tourists' resort. The Wombeyan Caves, which rival those of Jenolan, are within 40 miles of Goulburn, from which they are reached by a good road.

TARALGA, 12 miles south of the Wombeyan Caves, is surrounded by an agricultural and pastoral district, and has a population of about 450.

BUNDANOON, MOSS VALE, BOWRAL and MITTAGONG are important stations on the Great Southern Railway, between Goulburn and Sydney. Their splendid summer climate and picturesque surroundings attract tourists and residents of the metropolis in great numbers during the warmer months of the year, and scores of Sydney merchants and professional men have established country seats near these towns. The well-known Fitzroy Falls are within a few miles of Moss Vale, on the road to the Kangaroo Valley. Iron and coal occur near Mittagong, and so-called "trachyte" is quarried at "The Gib," near Bowral, and sent to Sydney in large quantities for building purposes. The permanent residents of the districts surrounding all

these towns are, for the most part, engaged in farming and dairying.

On the railway line within the limits of the Blue Mountains are—WALLERAWANG (at the junction of the Great Western and Mudgee Railway Lines); MOUNT VICTORIA, BLACKHEATH, MEDLOW, KATOOMBA, LEURA, WENTWORTH FALLS, LAWSON and SPRINGWOOD, nearly all of which are adjacent to beautiful scenery, and are visited during the summer months by large numbers of Sydney residents. Coaches ply daily from Mount Victoria to the Jenolan Caves, 36 miles distant. Close to Blackheath is the far-famed *Govett's Leap* cascade and magnificent *Grose Valley*, and within a mile of the Katoomba railway station are *Leura Falls*, probably the finest in the State.

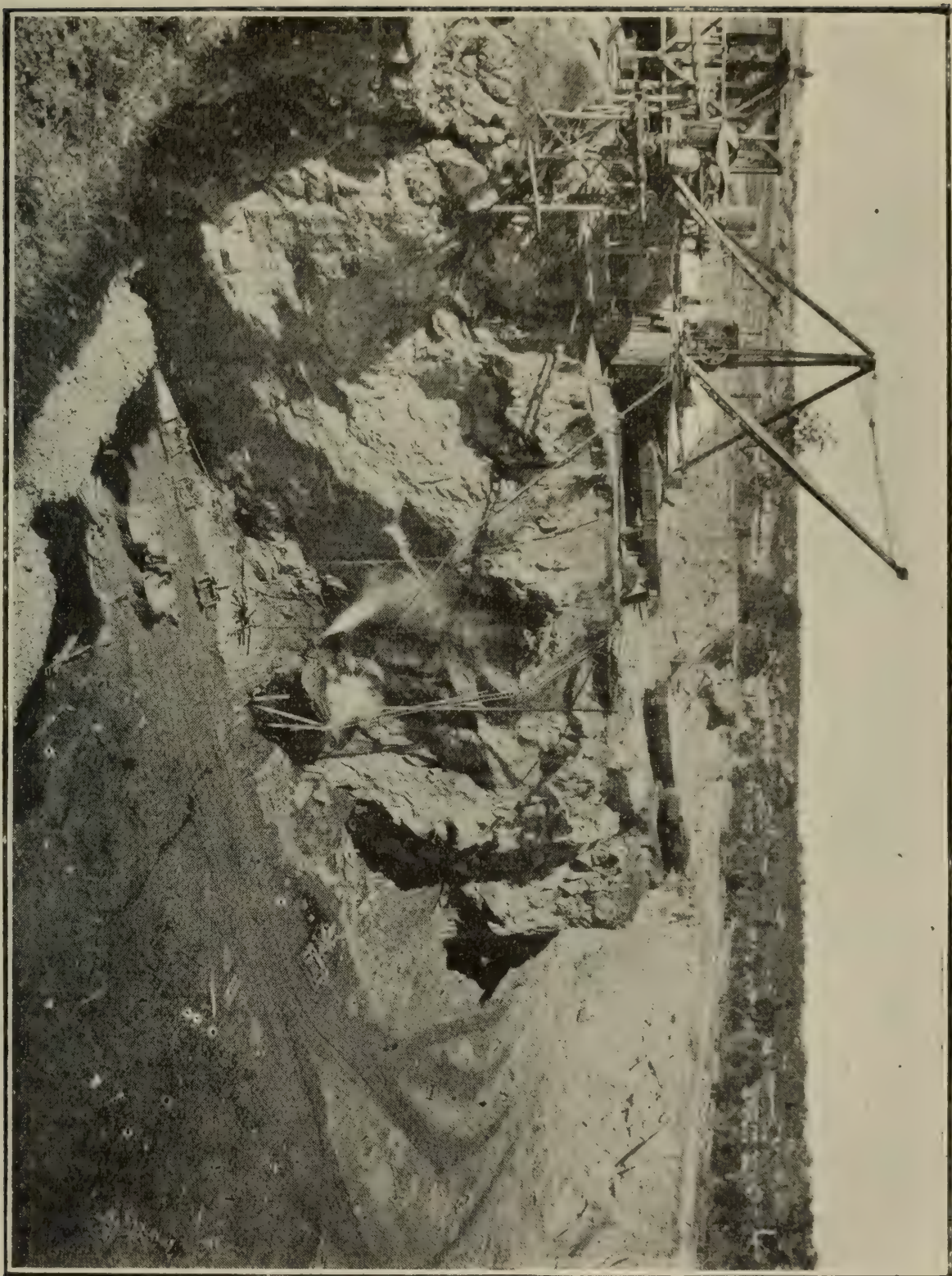
WALLERAWANG is a busy railway junction, and PORTLAND, six miles along the Mudgee line, is noted for its cement works, the largest and most up-to-date in Australia.

LITHGOW, 96 miles by rail from Sydney and near the foot of the now disused Zig-Zag, is an important industrial centre. Coal is raised in large quantities, while its extensive iron works, small arms factory, and pottery and pipe works combine to make Lithgow one of the foremost industrial centres of the State. Lithgow also possesses lime works, saw mills, and a large tweed factory.

Within easy reach of Lithgow by rail is the kerosene-providing township of *Newnes*, in the picturesque Wolgan Valley.

(b) IN THE UPPER MACQUARIE BASIN.

BATHURST, the "City of the Plains," one of the chief business centres west of the Blue Mountains, is built on the left bank of the Macquarie River. It is a station on the Great Western Railway, 145 miles from Sydney; it also has direct railway communication with Melbourne by the Blayney-Harden line, which connects the Great Western and Great Southern railway systems. The city which was founded in 1815, and named by Governor Macquarie in honour of Lord Bathurst, then Secretary of



LIMESTONE QUARRY—PORTLAND CEMENT WORKS.

State for the Colonies, is laid out in wide streets, lined with trees, and is one of the finest inland towns in the State. The district immediately surrounding the city consists of good farming, dairying, and pastoral lands, known as the Bathurst Plains, long in high repute for their large yields of cereal crops, chiefly wheat. The once productive gold-fields of Wattle Flat, Sofala, Hill End, Tambaroora and Newbridge are within the district. The manufactories of Bathurst include coach factories, flour mills, breweries, railway workshops, tanneries, and soap and candle, glue, and boot factories. The public buildings occupy a handsome block in the centre of the town, while two cathedrals, together with churches, colleges, and schools add to the attractiveness of the city. The Government Experimental Farm at Bathurst has achieved great success by showing what scientific cultivation can do with land not commonly thought fit for farming.

ORANGE, at the junction of the Great Western Railway with the branch line to Molong, is an important trading centre in the midst of a pastoral, agricultural, fruit-growing and mining district. Wheat and maize are largely grown, and the fruit industry (comprising the growing of oranges, apples, and cherries), promises to attain very large proportions. Dairy-farming is also largely carried on. Orange was in time past surrounded by mineral wealth. At Summer Hill Creek gold was first discovered in large quantities by Hargraves and others in 1851. The Lewis Ponds and Lucknow fields were the chief gold-mining centres in the district, while the Wentworth mines at Lucknow in 1895 yielded over £300,000 worth of gold. Orange contains several very large stores and flour mills, tanneries, foundries, breweries, and soap and candle factories, and is supplied with water from a large reservoir at Gosling Creek, two miles distant, which is capable of holding 125,000,000 gallons. Orange is widely regarded as the "sanatorium of the west." It lies amid grassy hills, and eight miles away tower the picturesque Canoblas, on the peaks of which snow lies for several months of the year.



VIEW OF BATHURST.

WELLINGTON, picturesquely situated at the junction of the Macquarie and Bell Rivers, is surrounded by agricultural and pastoral lands. The chief crops raised are wheat, oats, and maize. The river is spanned here by one of the largest railway bridges in the State. The town is built at the foot of a range of hills 1,000 feet above sea-level. The well-known Wellington Caves, so frequently visited by tourists, are situated on the banks of the Bell River, about five miles distant from the town. From these limestone caverns have been obtained strange tools and weapons, as well as the fossil remains of giant echidnas, deprotodons, and long-extinct marsupial lions. All up the Wellington Valley are rich farms, which yield enormous crops of wheat.

MUDGEES, an important town in a rich dairying, fruit-growing and pastoral district, stands on the Cudgegong River, and is one of the most important trade centres on the railway which branches off from the Great Western trunk line at Wallerawang. The town is well laid out, and is lighted with gas. The wool and merino stud rams from this district have an English as well as an Australian reputation; and wheat, wine, and fruits are largely grown. Dairy-farming has made rapid strides during late years; but the varied mineral deposits of the district are for the most part only partially developed. The once-productive Gulgong, Hargraves, and Pyramul goldfields are within easy distance of the town.

GULGONG, an important railway town 18 miles north of Mudgee, stands in the centre of a formerly rich goldfield. Some gold-miners are still engaged in the district in working reefs and fossicking; but the rich alluvial flats have, for the most part, been taken up by selectors and devoted to dairy-farming, wheat-growing, and sheep-raising.

RYLSTONE, a rising town on the Cudgegong River, and a railway station, distant 32 miles from Mudgee, is surrounded by a district rich in pastoral and mineral wealth.

HILL END, a gold-mining township, 37 miles north of

Bathurst, was, about 1872, one of the richest goldfields in the State.

STUART TOWN (late *Ironbark*), a railway township, between Orange and Wellington, is surrounded by a district abounding in quartz reefs and alluvial goldfields.

MOLONG, an important station on the branch railway line from Orange to the Lachlan is situated in a farming, pastoral, and mining district.

(c) IN THE UPPER LACHLAN BASIN.

BLAYNEY, at the junction of the Great Western and the Blayney-Harden Railway Lines, is surrounded by a large wheat-growing district. Copper and gold-mining, as well as sheep-farming, are also carried on to a limited extent.

MILLTHORPE is a thriving township eight miles from Blayney. Wheat and fruit-growing are the industries of the neighbourhood.

CARCOAR, on the Blayney-Harden Railway Line, is surrounded by agricultural, pastoral, and dairy-farming lands, watered by the Belubula River which also intersects the town. Wheat is raised in large quantities, and the surrounding district is remarkable for the varied character of its mineral wealth. Mount Macquarie, a high peak, which is usually capped with snow during winter, dominates the landscape around Carcoar.

PARKES, a mining and agricultural town on the Orange-Forbes Railway. The surrounding district comprises good pastoral and wheat and fruit-growing land, and several valuable gold reefs are successfully worked close to the town.

COWRA, a railway town on the Blayney-Harden loop-line, is situated on the Lachlan River, just about where the tablelands merge into the plain country. The railway bridge spans the Lachlan half a mile from the town. For many years the district was entirely pastoral, but wheat-growing, dairying, and fruit-growing are now its main industries. The plains to the south of Cowra and the

granite country to the north are still famous for their wool-growing capabilities. Gold and copper mining are also carried on.

TUENA, a township on Tuena Creek, a tributary of the Abercrombie River, is distant 36 miles from Newbridge, the nearest railway station on the Western Line. Squatting, sheep-farming, wheat-growing and gold-mining are the pursuits of the district.

CROOKWELL, on the Crookwell River, a tributary of the Lachlan, is the centre of a district producing wheat, butter, fruit, and potatoes. It is connected by rail with Goulburn.

YOUNG, standing on Burrangong Creek, in one of the richest grain-growing districts in the State, is a station on the Blayney-Harden loop-line. The town is pleasantly situated, and lighted with electricity, and the surrounding district is devoted to the cultivation of wheat and fruit. Meat chilling is extensively carried on, and the Burrangong alluvial diggings are close to the town. In 1860 gold was discovered at Young, which was then known as Lambing Flat. There was soon a rush to the new field, and along with the European diggers came a horde of Chinamen, who lived partly by mining and partly by keeping gambling shops, where many of the white men lost their earnings. The Europeans of the field at length determined to drive the Chinese from the field. Serious rioting took place, and troops had to be sent from Sydney to restore and maintain order. A little mining is still carried on in the district, but its main industries are wheat-growing, sheep-farming, and fruit-growing.

BURROWA, a well laid out town on the river of the same name, and 16 miles from Binalong, on the Southern Line, is the chief centre of a flourishing pastoral and wheat-growing district. Dairy-farming and lucerne and wine-growing are also carried on. Two large volcanic hills, Big and Little Carramumbola close to the township add to the picturesqueness of the landscape.

(d) IN THE UPPER MURRUMBIDGEE BASIN.

MURRUMBURRAH, a pastoral, agricultural, and mining town on a tributary of the Jugiong River, is a station on the Great Southern Railway, two miles from Harden and about 20 miles from Young, Binalong, Jugiong, and Cootamundra. There is rich soil around Murrumburrah, while its gold deposits have a share in making the district prosperous.

YASS, on the Yass River, a tributary of the Murrumbidgee (10 miles distant), is a busy town near the Great Southern Line. Two substantial bridges span the river, one carrying the railway, the other leading to North Yass. Agricultural and pastoral pursuits are carried on in the adjoining district, and alluvial gold is obtained along the Yass River, but the mineral resources of the district are undeveloped.

BURRINJUCK is the site of the huge irrigation dam (across the Murrumbidgee) which is now rapidly approaching completion. It has communication by rail with the Great Southern Line at Goondah, and at present has a large population. The purpose of the dam is to irrigate a large tract of dry country extending north from Yanco (on the Murrumbidgee beyond Narrandera).

COOTAMUNDRA, an important station on the Great Southern Line, from which branch lines run *via* Temora and Wyalong to Barellan and *via* Gundagai to Tumut. The town is well laid out, and is surrounded by a rich pastoral, wheat-growing, and dairy-farming district. Gold-mining is also carried on to a limited extent.

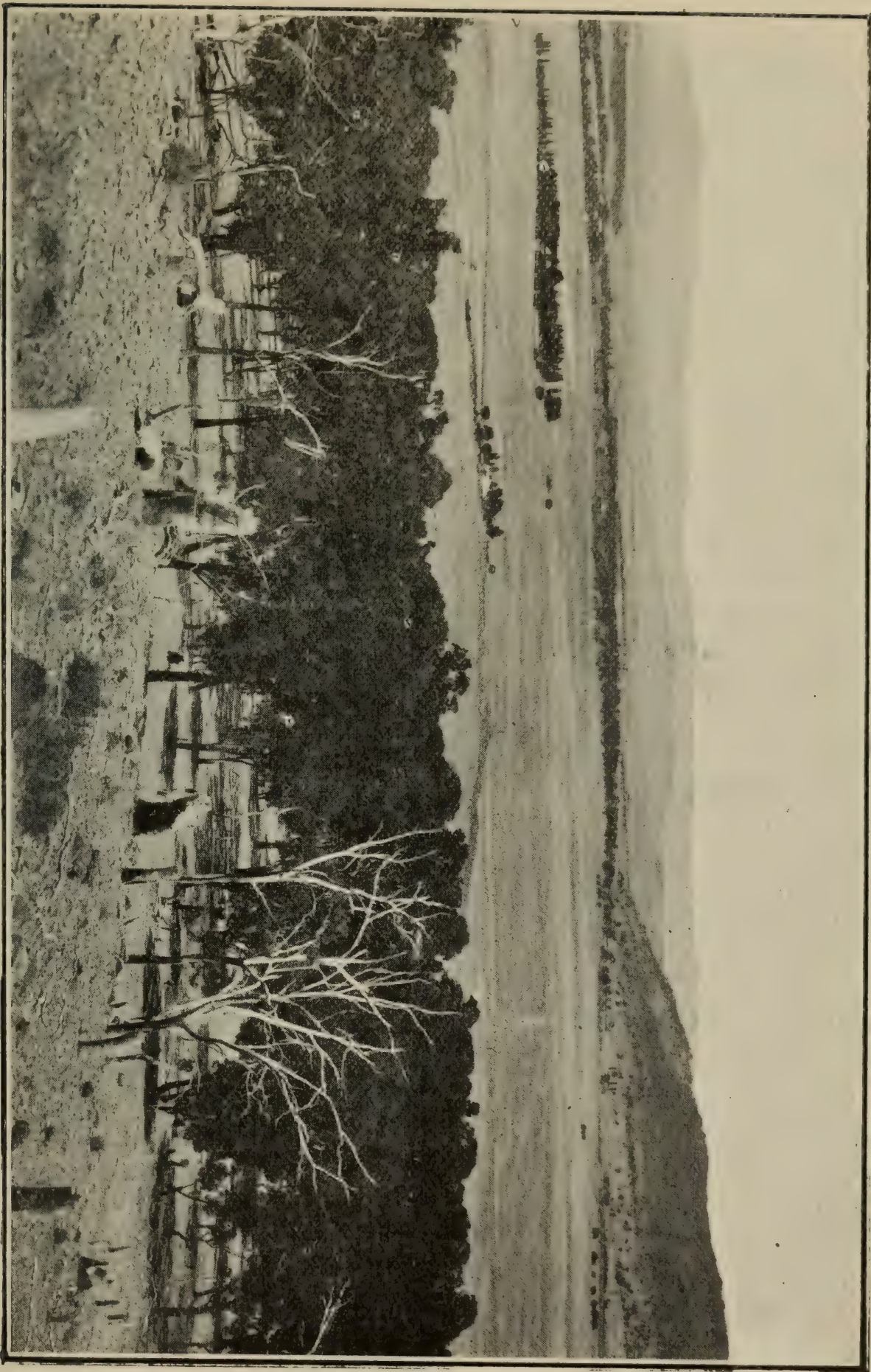
GUNDAGAI, situated at the head of navigation of the Murrumbidgee, is connected by rail with the Great Southern Line at Cootamundra, 34 miles distant. The site of the present town is elevated and beyond the reach of floods, the original township on the river flat having been washed away in 1852, when 71 dwellings were wrecked and 81 lives lost. Squatting and farming are the pursuits of the adjoining district. Gold-mining is also carried on, and

splendid white marble occurs within a few miles of the town. A costly iron bridge, connecting with South Gundagai, here spans the Murrumbidgee. Maize, tobacco, and wool are largely produced, and gold deposits of universal richness have been discovered.

ADELONG, a gold-mining township on Adelong Creek, 23 miles south of Gundagai, and the centre of one of the oldest quartz-reefing and alluvial goldfields in the State. In 1857, Adelong was a double row of tents forming the thoroughfare which is still known as Camp-street. In that year the discovery of gold in rubble was made, and over a dozen stamping machines were set up on what had been for the previous five years a purely alluvial field. The canvas tents have long since been replaced by substantial brick dwellings, and most of the old mining races have been turned to account to irrigate crops of potatoes and apples, although a little alluvial mining is still carried on. About 16 miles to the south of Adelong is Batlow, formerly a mining field, but now the centre of one of the best apple-growing districts in New South Wales.

TUMUT stands on the south bank of the Tumut River, 20 miles from Gundagai. The Tumut district has been long noted for its maize, which has a hard rind, and resists the attacks of the weevil. Apples and stone fruits are grown, and cattle fodder is raised on the alluvial flats along the river banks.

COOMA, the chief town of the Monaro district, is the largest town on the line from Goulburn to Nimitybelle. The town is situated in a hollow and encircled by ranges, which raise their rugged shoulders tier above tier as far as the eye can reach. Cooma is now in great favour with tourists, as it is within easy reach of Mount Kosciusko and the Yarrangobilly Caves, while its summer climate is cool and bracing. Squatting, agriculture, dairy-farming, and mining (to a limited extent) are the industries of the district. There are large stations (sheep, cattle and horses) close to the town. Cooma stands 2,657 feet above sea-level, and the Murrumbidgee is only five miles distant.



PORTION OF FEDERAL CAPITAL SITE.

ADAMINABY, a pastoral and agricultural village, on the road from Cooma to Kiandra, is a well-known halting place for tourists to the Yarrangobilly Caves. It is 26 miles from Cooma, and stands at an elevation of 3,000 feet above sea-level. The rich Kyloe Copper mine is three miles from Adaminaby.

CAPTAIN'S FLAT is a thriving township, 24 miles from Bungendore, the nearest railway station, on the Great Southern Line. Gold, silver, and copper are mined in the neighbourhood.

QUEANBEYAN, a railway town on the Goulburn-Nimitybelle Line, is situated on the Queanbeyan River about eight miles distant from the Federal Capital site. It is situated in the heart of a pastoral and agricultural area. Gold-mining is carried on in a few places in the district.

BUNGENDORE, a thriving township on the Goulburn-Nimitybelle Line, 43 miles from Goulburn and within four miles of Lake George. Sheep-farming and fruit-growing are the chief industries of the surrounding district.

(e) IN THE UPPER MURRAY BASIN.

TUMBERUMBA, an agricultural and mining township, 40 miles from Tumut, is noted for its ideal climate. Wheat, fruit, potatoes, and tobacco are largely grown, and gold-mining is also successfully carried on. The Ournie gold-field is 20 miles south of the town.

(f) THE CHIEF REMAINING TOWNS ON THE SOUTHERN TABLELAND ARE:—

BRAIDWOOD, standing on the Jillimatong Creek, a tributary of the Shoalhaven, distant five miles from the town. The industries of the district are sheep-farming and agriculture, while a little gold-mining is also carried on, chiefly at Major's Creek and Jembaicumbene. A good deal of mixed farming is carried on, but the development of the immense timber resources of the district is hampered by the want of facilities for getting it to market. Braidwood is distant 28 miles from Tarago, on the Cooma Line. A regular

motor car service exists between Braidwood and Tarago. *Nerriga* in the Braidwood district is noted for its wattle bark, which is sent to Nowra for shipment.

ARALUEN, a gold-mining township in the well-known Araluen Valley. The surrounding district is mountainous and very picturesque. Pastoral pursuits and agriculture are carried on in portions of the valley. The hills around Araluen and Braidwood are rapidly being stripped of their timber to provide fuel for the gold dredges of Araluen.

TOWNS IN THE SNOWY RIVER BASIN.

KIANDRA, the highest settlement in Australia, is a decayed mining village, 4,640 feet above sea-level. It is situated on the Eucumbene Creek, a tributary of the Snowy River. It is distant 14 miles from the Yarrangobilly Caves, and is becoming a favourite summer sanatorium. In winter the roads are occasionally piled up with snow-drifts, and for many months of the year the people, young and old alike, go about on snow-shoes. A carnival, consisting of races in snow-shoes, is held annually in the village, which is also a distributing centre for goods for a few sheep stations in this wind-swept district.

BOMBALA, on the Bombala River, is a leading trade centre of the Monaro district. The surrounding region is occupied by sheep farms and cattle stations, and gold-mining is carried on near the Victorian border. Bombala has coach communication with the seaports of Tathra, Merimbula, and Eden, and also with the railway at Nimitybelle (30 miles distant).

CATHCART, a few miles north-east of Bombala, is a small pastoral and agricultural township, having coach communication with Eden and Nimitybelle.

BUCKLEY'S CROSSING, 30 miles from Cooma, and an important crossing-place for stock over the Snowy River, is situated on the road from Cooma into Gippsland. Wheat-growing and grazing are the industries of the district.

DELEGATE, on the Delegate River, is a small township, 22 miles from Bombala, and close to the Victorian border.

TOWNS OF THE INTERIOR PLAINS.

MOREE, an important station on the Narrabri-Moree-Inverell Railway, stands on a small stream within two miles of the Gwydir River. The district is a pastoral one, and cereals and fruit flourish. A very successful artesian bore is in operation at Moree; indeed, the district is riddled with them.

WARIALDA, on Reedy (or Warialda) Creek, 40 miles west of Inverell, is the centre of a rich sheep-farming district.

WALGETT is a rising town, at the junction of the Namoi and Barwon Rivers. It is surrounded by large sheep and cattle stations, and commands the trade of an extensive district, stretching northward to the Queensland border. During freshets, small steamers can trade up the Barwon as far as this town. It is the present terminus of the North-Western Railway. The Tooloora (formerly Euroka) Artesian Bore, 12 miles from the town, yields two million gallons of water daily, and the whole Walgett district has been successfully pierced by artesian bores, which have proved of immense service to the sheep-station owners.

WEE WAA, on a lagoon of the same name near the Namoi River, is a rising town 25 miles west of Narrabri. It is surrounded by sheep stations, and wheat and fruit are grown in the district.

PILLIGA is an important centre of settlement in the Pilliga Scrub region. The district is rich in hardwood timbers, and the soil is well suited for wheat and fruit-growing.

NARRABRI is a thriving business centre and an important station on the North-Western Railway. It stands on the Narrabri Creek, a branch of the Namoi River, in the midst of a district devoted to sheep-farming, dairying, fruit-growing, and to raising of wheat. Several butter factories and refrigerating works carry on a brisk

trade, and the town is an important stock-trucking centre. The grape flourishes in the district, and, unfortunately for the farmer, so does the rabbit. The low-lying portions of the town and district are liable to floods.

TAMWORTH, on the Peel, is an important station on the Northern Railway, and the chief town of a mining, pastoral, and agricultural district, which includes the goldfields of Bowling Alley Point, Nundle, and Hanging Rock. The town is built on the slope of a mountain spur, and its broad streets are planted with shade trees, and illuminated by electric light. The district immediately surrounding Tamworth yields large crops of wheat, tobacco, potatoes, grapes, and lucerne. Dairy-farming is also a growing industry in the Tamworth district.

GUNNEDAH, an important station on the North-Western Railway, is situated on the Namoi, two miles below its junction with the Mooki. The district is mainly pastoral, but wheat, maize, and potatoes are also grown, and several small collieries are worked in the district.

QUIRINDI, on Quirindi Creek, a tributary of the Namoi, is the nearest station on the Northern Line to the Liverpool Plains. The surrounding district is devoted mainly to wheat-growing and sheep-farming. Much of the stock from the Liverpool Plains is trucked here for sale at Maitland and the metropolis.

COONARARABRAN, on the Castlereagh River, about 20 miles from its source, has coach communication with Gunnedah and Dunedoo. The district is well watered, and grazing and farming are its chief industries. When Coonabarabran has railway communication with Dunedoo, the wheat and fruit-growing industries of the district should be immensely increased.

COONAMBLE is situated on the Castlereagh River, in the midst of a sheep-grazing and wheat-growing district, and has communication by rail with Dubbo, distant 100 miles to the south. The streets are planted with shade trees. The Coonamble artesian bore, sunk to the depth of 1,300 feet, yields 2,000,000 million gallons of water daily, and the bore-

water is laid on to the town. Fine crops of wheat have been obtained in recent years in the Coonamble district, and with the aid of irrigation from artesian bores, fine crops of maize, lucerne, sorghum, and fruits are now produced. Between Coonamble and Dubbo are the important railway towns of *Gilgandra* and *Gulargambone*, noted for their wheat, wool, and timber (iron-bark chiefly).

BREWARRINA, on the Barwon River, 60 miles above Bourke by road and 160 miles by water, is the centre of an extensive sheep-farming district. It connects with the Great Western Railway at Byrock. The surrounding country is monotonously flat, but to the north lies a huge tract of rich, well watered, black soil country. A large iron bridge spans the Barwon at this place.

BOURKE, the terminus of the Great Western Railway, stands on the left bank of the Darling, seven miles below the Bogan junction, and is distant 503 miles north-west from Sydney. Six miles below the site of the present town Sir Thomas Mitchell, in 1835, when in search of the ultimate destination of the Darling River, erected a wooden barricade as a means of defence against the blacks. This he called Fort Bourke, in honour of Sir Richard Bourke, the Governor of the colony. The surrounding district is occupied by sheep stations, and the boiling-down and meat-preserving works in the town treat about 2,500 sheep per day, and employ 200 hands. A weir and lock have been constructed in the river some distance below the town, and steamers from South Australia trade up to and beyond Bourke, except in the dry season. Several successful artesian wells have been put down on the northern side of the river. During favourable seasons the surrounding plains are clothed with good pasturage, and at intervals belts of salt-bush occur.

COBAR, Australia's most important copper-mining town, is connected by rail with Nyngan, on the Great Western Railway. The surrounding district is devoted to grazing and to copper and gold-mining. The Great Cobar Copper Mine, the largest of its kind in the State, employs at

present about 2,200 persons (among them 1,300 copper-miners, and 600 gold employees). The mineral yield per year of the mines of the Cobar district exceeds £750,000 (copper contributing £500,000 and gold £250,000). The chief mining centres of this field are *Cobar*, *Canbelago*, *Illewong*, *Mount Drysdale*, C.S.A. (i.e., Cornish, Scottish, and Australian, from the nationalities of the original promoters), *Nyngan* and *Shuttleton*. The word "Cobar" is said to be derived from "copar," the blackfellows' term for the coloured earths used then for decorating their bodies. As to the origin of copper-mining at Cobar there are various stories, but it would appear that a Cornish woman (Mrs. Kruge) of the district was the first to discover the mineral value of the red, green and blue ochre earths which had been discovered in 1869 by two men—Hartman and Campbell—by whom they were shown to her. Consequently in the following year (1870), mining operations were commenced at Cobar. About 30 miles east of Cobar are the *Mount Boppy Gold Mines*, the premier gold mine of New South Wales. At *Wrightville*, a few miles from Cobar, there is a hundred-head stamper battery, the largest in the State.

NYMAGEE is a pastoral and copper-mining township, 68 miles from Nyngan.

NYNGAN, on the Bogan River, is a station on the Great Western Railway, at the junction of the branch line to Cobar. The district is pastoral, and boiling-down and meat-chilling works are in operation in the town.

DUBBO, on the Macquarie River, distant 278 miles by rail from Sydney, is a flourishing town in an extensive sheep-farming and wheat-growing district. Until a few years ago the prosperity of the town depended upon the pastoral industry, but wheat-growing has proved so profitable that a large number of farmers have settled on the land, and Dubbo is now the centre of a large agricultural settlement. The success of the district in this regard is due mainly to irrigation and the adoption of dry-farming methods. Dubbo is said to have derived its name from

“dubbah,” the blackfellows’ word for the clay pigments which they scraped from the creek-beds of the neighbourhood to paint the tribal patterns on their bodies.

WARREN, the most important town on the Macquarie beyond Dubbo, is surrounded by large sheep stations and is 12 miles distant from Nevertire, with which it is connected by rail.

PEAK HILL, on the Bogan, 45 miles south-west of Dubbo, is a decayed gold-mining town, and the centre of a large sheep-farming area.

MOUNT HOPE, a small copper and gold-mining township in the Lachlan district, with coach communication to Nyngan and to Hillston.

WILCANNIA is the river port of the Central Darling, of the Paroo, of the Barcoo, and of the mineral country of the Barrier Ranges, from which much wool and stock from north-western New South Wales and south-western Queensland is shipped. The surrounding district is devoted to grazing. At White Cliffs, 60 miles from Wilcannia, some of the finest noble opal is found. Wilcannia is the trade centre for several outlying townships, such as Milparinka, near Mount Brown, and Wanaaring, on the Paroo. Steamers of shallow draught trade up the Darling to Wilcannia with stores and return down stream laden heavily with wool. Each steamer, as a rule, has in tow one or two barges. Land traffic around Wilcannia is carried on by means of horse, bullock, and camel teams.

BROKEN HILL, situated in the heart of the Barrier silver field, is, after Sydney and Newcastle, the most populous town in the State. It is connected by railway with Port Pirie and Adelaide, in South Australia. The ore deposits of the Barrier contain all the different species of silver ore, are rich in lead, and contain in addition a fair percentage of gold, copper, and zinc. One of the mines—the Proprietary—is regarded by mining experts as the richest silver mine in the world. Operations were commenced at this mine in 1886, and since then it has been worked day and night, in three “shifts,” and has already (1912) paid



Camel Caravan, Wandering Road, Wandering District.

over nine millions sterling in dividends. The value of mineral output from the Broken Hill mines for 1911 was the largest recorded for several years past. The Broken Hill silver mines employ over 5,000 hands, and their concentrating, amalgamating, smelting, and refining plants are of the most modern description. The limestone fluxes used in smelting are obtained in large quantities from the quarries at Tarrawingee. Much of the low-grade silver ore is sent for treatment to the electrolytic and smelting works at Port Kembla, in the Illawarra district, the establishment of which has already given a marked impetus to mining throughout the State. The town is incorporated, and has in addition a good water supply. Squatting is carried on extensively in the surrounding districts.

SILVERTON, an almost abandoned town on the Barrier silver field, stands on a small creek 18 miles from the South Australian border. The chief mines are those of UMBER-UMBERKA, which extend southwards to Thackaringa, the spot where the first silver found in the Barrier was discovered by Charles Rasp, a boundary rider belonging to the Mount Gipps run.

MENINDIE, a pastoral township on the Darling River, 100 miles below Wilcannia, is a place of historic interest, as the spot whence Burke and Wills, in 1860, set out on their fatal journey to the Gulf of Carpentaria.

WENTWORTH stands near the junction of the Darling and the Murray, and is surrounded by extensive sheep stations. The steamer traffic on the river is large and yearly increasing. In dry seasons, when the Darling is unnavigable, Wentworth is the chief depot whence stores are supplied to the interior. Close by the town is a valuable and successful irrigation farm.

BALRANALD, on the Murrumbidgee River, about 18 miles above its junction with the Murray, is surrounded by a flourishing pastoral district. The Murray River steamers trade to the town, and take away large quantities of wool.

HAY, the terminus of the South-Western Railway, is prettily situated in a bend of the Murrumbidgee River, and

is surrounded by large sheep stations. For about half the year steamers ply between Hay and Adelaide. This town is the chief receiving station for the wool clip of the Lachlan and Murrumbidgee. A fine iron bridge, nearly a quarter of a mile long, spans the Murrumbidgee at Hay.

NARRANDERA is a thriving town on the Junee to Hay Railway, at the junction of the branch line to Finley *via* Jerilderie and Berrigan. The town stands on the Murrumbidgee, and is the chief crossing place for stock travelling from Queensland to Wagga, Albury, and Melbourne. The river is here crossed by a massive railway bridge. The district at present is mainly devoted to sheep farming, but wheat growing is extending. The railway from Junee to Narrandera passes through the wheat belt, the busy thriving character of the wheat towns of MARRAR, COOLAMON, GANMAIN, MATONG and GRONG GRONG showing plainly the great wealth of this part of the State. A few miles up stream from Narrandera is the *Berrembed Weir* which holds back the Murrumbidgee waters for use on the Yanco irrigation settlements. The feature of greatest interest at Narrandera is the huge canal along which this water flows on to Yanco. When the Burrinjuck dam is completed, and the Yanco irrigation area is cut up into farms and in full working, Narrandera is certain to be a business centre of great importance.

LEETON, the headquarters of the extensive engineering and farming operations now (1912) in progress on the Northern Murrumbidgee Irrigation Area. The huge channel which conducts the Burrinjuck waters to the farms of Yanco, and to the irrigable lands lying away to the north and west, passes close to Leeton. The population at present (Sept. 1912) is about 1,300, and consists of Government engineers, draftsmen, and employees engaged in canal construction, as well as the occupiers of the irrigation farms that have been made available for settlement. Most of the residents at present are living under canvas, but there are besides a considerable number of large substantially-built residences and smaller cottages.

The settlement is about three miles from the Yanco railway station, and received its name in honour of the Hon. Charles Lee, who was the Minister in control of the Public Works Department when the huge Burrinjuck Irrigation scheme was initiated and launched.

FORBES, the chief town of the old-time Lachlan gold-fields, has railway connection with Orange, *via* Parkes and Molong. Squatting, wheat-growing and gold-mining are the chief industries of the district, and its chief agricultural products are wheat, fruit, maize, oats, and potatoes. The industries of the town comprise woolscouring and meat chilling works, breweries, and saw and flour mills. The Lachlan flows within a short distance of the town. In the fine pastoral country for which Forbes provides an outlet, are some of the largest sheep-runs of the State. Irrigation is successfully practised in parts of the district, and by means of it in one case the lucerne grown on a 200-acre field enabled 15,000 sheep to be fed throughout a dry season. Close to Forbes there are plentiful indications of old-time mining. There was a rush at Forbes in the early sixties, when the population was a motley and disorderly crowd of 60,000 people. It was in these far-off roaring days that the Forbes gold escort was stuck up near Eugowra (27 miles from Forbes), by the bushranger Frank Gardiner and his gang, who secured treasure to the amount of £14,000.

CONDOBOLIN, HILLSTON and BOOLIGAL are important townships on the Lachlan, in the midst of extensive sheep stations. Condobolin has direct railway communication with Sydney *via* Molong and Orange. About 40 miles from Condobolin an important silver deposit was discovered in 1912.

GRENFELL, on Emu Creek, 24 miles from Cowra, is the present terminus of the branch railway line from Koora-watha. Wheat, maize, and fruit are the chief agricultural products. Grenfell was once a prosperous alluvial gold-field and is still of good repute as a mining centre, but it now depends mainly upon the capacity

of its rich red soil for growing wheat and fruit. Extensive cyaniding works treat over 1,000 tons of ore weekly, and give employment to a large number of men. The Weddin Mountains are seven miles distant from the town.

TEMORA, once a gold-mining town, but now a prosperous wheat-growing centre, is connected by rail with the Great Southern Line at Cootamundra. Numerous nuggets, of various sizes, from 175 ozs. downwards were found during the Temora gold rush of 1880.

WYALONG was at one time an important gold-mining town, but is now the centre of a thriving wheat-growing area. Beyond the wheat-growing belt there are several large sheep-runs. It is 40 miles north-west of Temora, and is a place of considerable trade in wheat and wool.

BARELLAN, the terminus of a branch line running west from Temora, is an important wheat-growing centre, while sheep farming and fruit-growing are also carried on in the district.

JUNEE, an important town on the Great Southern Railway, at the point of junction of the branch line to Narrandera and Hay. It is in the midst of one of the chief wheat-growing districts in the State. Agriculture and squatting are the main industries of the people in the surrounding district, and a large railway locomotive depot in the town employs a large number of hands. The town has an elaborate water supply, the reservoir being capable of holding 140,000,000 gallons. A good deal of mixed farming (sheep and wheat) is carried on in the district.

WAGGA WAGGA, the chief town in Riverina, is situated on the Murrumbidgee River, and is one of the most important towns on the Great Southern Railway. It is in the midst of a flourishing pastoral and agricultural district. The chief agricultural products are wheat, tobacco, potatoes and wine. A highly successful experimental farm, conducted under Government control, is in operation near the town. A massive railway bridge, provided with elaborate approaches, spans the Murrumbidgee at Wagga.

JERILDERIE, situated on the Billabong Creek, 40 miles from the Victorian border, is surrounded by huge sheep runs, and is an important business centre on the Narrandera-Finley railway line. BERRIGAN, an important business centre in a sheep farming and wheat-growing district further south, is within 20 miles of the Murray River, whence it derives its water supply, the pumping station being situated at BAROOGA. TOCUMWAL, on the Murray, is the outlet for a considerable wool and wheat trade, which passes across the border to the Victorian market. Squatting, wheat-farming and fruit-growing are the pursuits of the surrounding district.

GERMANTON is distant 38 miles from Albury in a district occupied by sheep stations, wheat-farms, and vineyards.

ALBURY, a very pretty town, on the right bank of the Murray, is connected with Wodonga, in Victoria, by two bridges—a substantial wooden structure for ordinary traffic, and a handsome iron bridge for the railway service. In 1824, Hume and Hovell, the first explorers of the Upper Murray, crossed the river at a point north-east of Albury. The surrounding district is agricultural and pastoral, and gold-mining is also carried on. The grape flourishes in the district, and Albury wines are in great request all over Australia, and have acquired a European reputation besides. Tobacco culture and dairy-farming are the chief remaining industries of the district. Small steamers trade to Albury for the greater part of the year.

CULCAIRN, a small township at the junction of the Corowa branch with the Great Southern Railway, has railway communication with the wine-growing district surrounding Germanton.

COROWA, on the Murray, 40 miles below Albury, has direct railway communication with Sydney by the branch line to the Great Southern Railway at Culcairn. It is within half a mile of the Wahgunyah railway station, in Victoria, being thus within easy reach of Melbourne by rail. Large quantities of wheat are raised in the district, and

the rich chocolate soil has been found admirably suited for the growth of heavy, sweet wines.

DENILQUIN is a thriving pastoral, farming, and wine-growing town in Riverina, and is connected by a private line with the Victorian railway system at Moama. The surrounding district consists of vast plains, covered with native grass and saltbush, intersected by clumps of timber, and occupied for sheep and cattle-runs and wheat farms.

MOAMA is a border town, standing on the north bank of the Murray, opposite Echuca. The river is here spanned by a massive iron bridge for the railway and general traffic. It was constructed at a cost of £100,000, at the joint expense of the New South Wales and Victorian Governments. The surrounding district is devoted to sheep-farming and wheat-growing.

RAILWAYS.

With the exception of two short lines—viz. (i.) from Deniliquin to Moama, and (ii.) from Broken Hill to the South Australian border—the railways of New South Wales are entirely under Government control, and have been constructed on a four feet eight and a half inch gauge. Their existence dates from 1855, when the line from Sydney to Parramatta was opened for traffic. Since that time the other lines have been constructed from time to time with the progress of settlement and trade, and the State now possesses a very serviceable network of lines connecting the chief centres of population, and all converging more or less upon the great shipping ports of Sydney and Newcastle. The three great trunk lines are—(i.) the *Great Southern*, from Sydney to Albury, whence it connects with the railway system of Victoria; (ii.) the *Great Western*, stretching from Sydney westward across the Blue Mountains, and onward to Bourke, on the banks of the Darling; and (iii.) the *Great Northern*, from Sydney, *via* Newcastle, to the Queensland border, where it connects with the railway system of the northern State at Wallangarra. By means of the Great Northern and the Great Southern Lines a

complete connection by rail exists between Brisbane, Sydney, Melbourne and Adelaide.

In addition to the trunk lines several branch lines have been constructed through different parts of the State to act as feeders to the parent systems, and to serve the requirements of important industrial centres. Of these the principal are:—

- (i.) *Nyngan to Cobar Line.*
- (ii.) The *North-Western Line* from Werris Creek through the Liverpool Plains *via* Gunnedah, and Narrabri to Walgett; with a branch from Narrabri to Moree and Inverell.
- (iii.) The *Wallerawang to Dunedoo Line*, *via* Portland, Rylstone, Mudgee, and Gulgong.
- (iv.) The *Blacktown to Richmond Line*, *via* Windsor.
- (v.) The *Blayney to Harden Line*, forming a loop between the Great Western and Great Southern Lines.
- (vi.) The *Orange to Condobolin Line*, *via* Molong, with branches from Parkes to Forbes, and from Bogan Gate to Tullamore.
- (vii.) The *Cootamundra to Barellan Line*, with a branch from Temora to Wyalong.
- (viii.) The *Cootamundra to Tumut Line*, *via* Gundagai.
- (ix.) The *Junee to Hay Line*, with a branch from Narrandera, *via* Berrigan, to Finley.
- (x.) The *Rock to Clear Hills Line*, *via* Lockhart and Urana.
- (xi.) *Culcairn to Corowa*, and *Culcairn to Germanton Lines.*
- (xii.) *Goulburn to Nimitybelle*, *via* Cooma.
- (xiii.) The *South Coast Line*, from Sydney southwards through the Illawarra district, and terminating on the north bank of the Shoalhaven River close to Nowra.
- (xiv.) *Grafton to Murwillumbah Line*, *via* Casino, Lismore, and Byron Bay, with a branch from Casino to Kyogle.

- (xv.) *Nevertire to Warren Line*, about 12 miles long.
- (xvi.) *Narromine to Peak Hill Line*.
- (xvii.) *Tamworth to Barraba Line*, via Manila.
- (xviii.) *Cowra to Canowindra Line*.
- (xix.) *Koorawatha to Grenfell Line*.
- (xx.) *Goondah to Burrinjuck*.
- (xxi.) *North Coast Line, West Maitland to Dungog*,
whence it is being constructed to *Grafton*, via
Taree, Kempsey, etc.

In the matter of railways, New South Wales bears favourable comparison with other countries. It possesses one mile of railway to every 466 persons, and the policy of the country for several years has been to favour the construction of pioneer lines to promote settlement in outlying districts. Before the construction of any railway can be authorised by the Legislature the proposal has to be submitted for thorough investigation to a Public Works Committee, who have to furnish a report to Parliament. When any railway line is completed, its control is undertaken by the Railway Commissioners.

TOURIST RESORTS.

Within the limits of New South Wales there is to be found some of the finest scenery in Australia. Sydney Harbour, the Botanic Gardens, and numberless other places of interest within and near the metropolis, furnish abundant holiday attractions for visitors from the country districts; while, on the other hand, the residents of Sydney have the advantage of being within easy distance, by rail, of water and mountain scenes remarkable for their sustained beauty. In addition to these the State of New South Wales can boast of the possession of the Jenolan and Yarrangobilly limestone caves, which, for extent and grandeur, have few superiors.

The chief tourist resorts, other than the great surf-bathing centres of Manly, Bondi, Coogee, Cronulla, etc. (all close to the metropolis), are the following:—

I.—ON THE GREAT WESTERN RAILWAY.—*Penrith, Emu Plains, Springwood, Lawson, Wentworth Falls, Leura, Katoomba, Blackheath, Mount Victoria, Eskbank, Tarana, and Bathurst.*

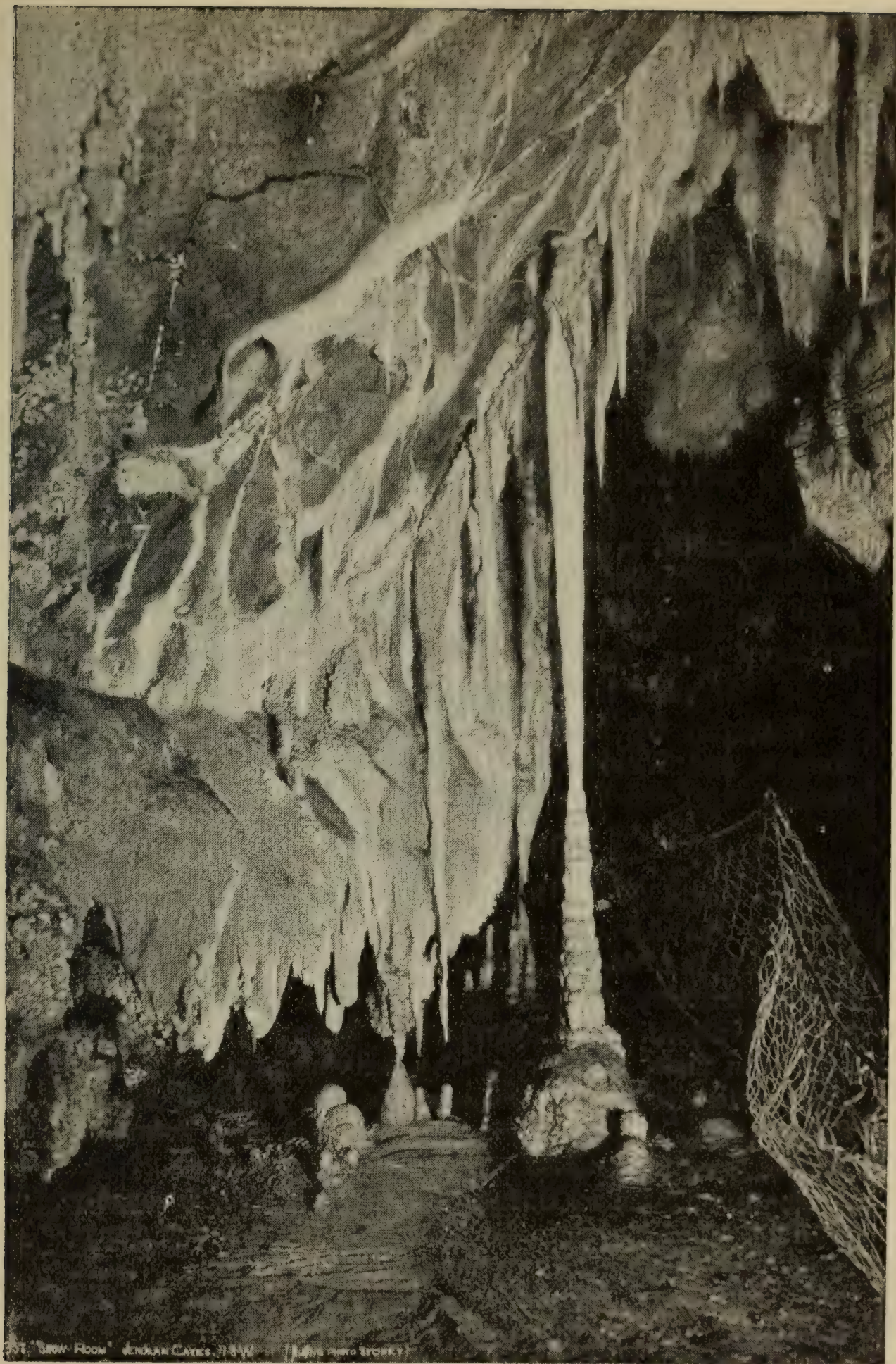
Close to Penrith is the Nepean and Warragamba River scenery. Motor cars ply daily from Mount Victoria to the Jenolan Caves, 36 miles distant. The well-known *Govett's Leap*, which plunges some 520 feet into the Grose Valley is within two miles of Blackheath railway station, while near by are *The Grand Cañon* and *Perry's Lookdown*. *Leura Falls*, the finest cascade in the State, is close to both Leura and Katoomba. Close to Wentworth Falls are the beautiful *National Pass* and *the Valley of the Waters*. Eskbank is close to the Zig-Zag, a remarkable railway engineering curiosity; and Tarana is about 35 miles distant from the Jenolan Caves, to which coaches run daily *via* Oberon.

II.—ON THE GREAT SOUTHERN RAILWAY.—*Picton, Mittagong, Bowral, Moss Vale, Bundanoon, and Goulburn.*

Between Picton and Mittagong access is obtained to several places of interest. Twelve miles from Moss Vale are the *Fitzroy Falls*, with their adjoining valley scenery. Sunken valley scenery is met with close to Bundanoon, and the well-known Wombeyan Caves are within easy reach of Goulburn.

III.—ON THE GREAT NORTHERN RAILWAY.—*Hornsby, the Hawkesbury River, Woy Woy, Gosford, Tuggerah Lakes, Lake Macquarie, and Newcastle, and the railway towns on the Northern Tableland.*

Within easy reach of Hornsby is the *Kuring-gai Chase*, a national reserve. Further along the line are the Hawkesbury River, Woy Woy, Tuggerah Lakes, and Lake Macquarie, all of which possess abundant facilities for fishing and boating, and are largely visited. North of Newcastle are Port Stephens, and the charming lake-studded district inland from Cape Hawke.



Copyright Photo.

"SHOW ROOM"—JENOLAN CAVES.

King, Sydney.

IV.—ON THE SOUTH COAST RAILWAY.—*Como, National Park, Stanwell Park, Clifton, Bulli, Wollongong, Dapto, Kiama, and Nowra.*

Como is a favourite fishing and boating resort, the National Park is a great public reserve possessing varied holiday attractions, Bulli is close to Bulli Pass, and Wollongong is a much-frequented watering-place. Dapto is near the Illawarra Lake. Kiama's great attraction is the *Blow Hole*; while Nowra, possessing abundant fishing facilities, is close to the Cambewarra Mountain, from the top of which the outlook is one of the finest in the State.

V.—ON THE GOULBURN TO COOMA RAILWAY.—*Bungendore and Cooma.*

Bungendore is within five miles of Lake George, and Cooma is 65 miles from the *Yarrangobilly Caves* and 60 miles from the summit of Mount Kosciusko.

VI.—ON THE BLACKTOWN TO RICHMOND RAILWAY.—*Windsor and Richmond.*

Within a few miles of Richmond are the Kurrajong Heights, and Windsor is within easy reach of the head of navigation of the Hawkesbury.

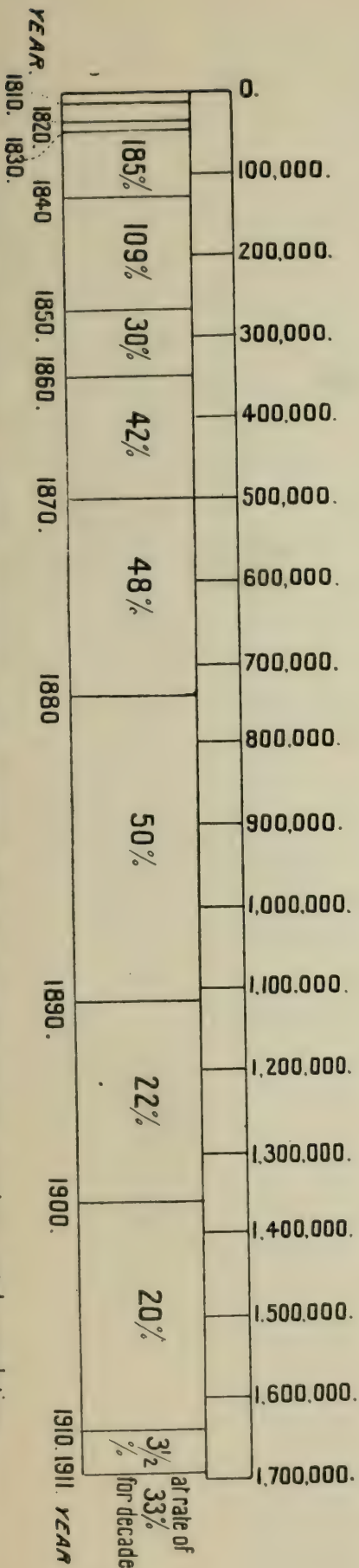
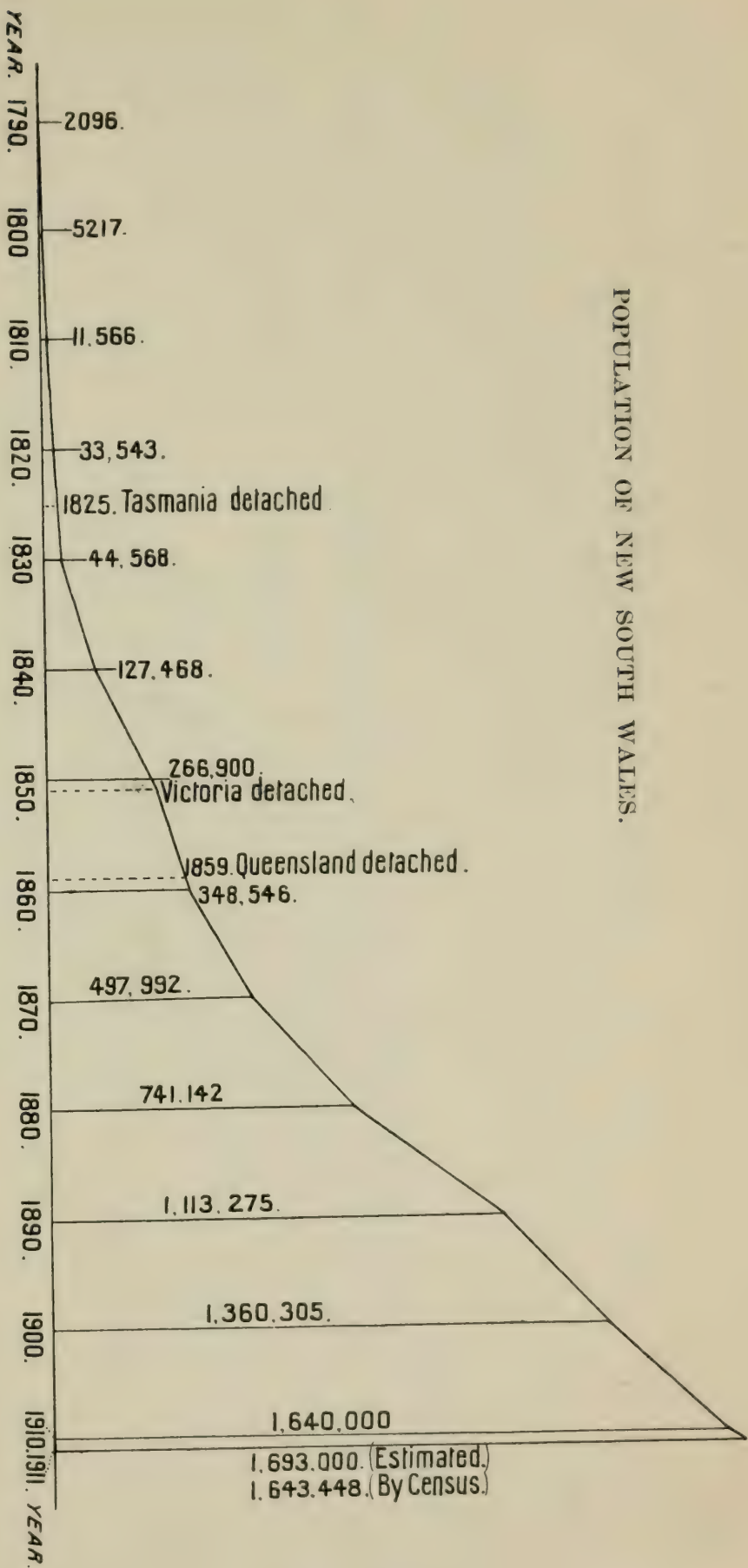
POPULATION.

New South Wales has a larger population than any other of the Australian States. In round numbers, the population is 1,700,000, and this is exclusive of the Federal Capital territory (in the Yass-Canberra district of New South Wales), whose population is now (1912) about 2,000. In view, however, of the carrying out of the proposed extensive works incidental to the building of the Federal City, this number is likely in the near future to be very greatly increased.

The population of Sydney, the State capital, is roughly 700,000, while that of the towns in the country range from over 60,000 to a few hundred.

The largest country town is the great coal port of Newcastle with 63,000 people.

POPULATION OF NEW SOUTH WALES.



NOTE. The percentage shown represents the increase for the decade on the previous total population

SYDNEY WATER SUPPLY.

In 1850, the old Legislative Council gave authority to the Council of the City Corporation to construct water and sewerage works, and in accordance with this authority a water supply scheme for the City of Sydney was carried out at a cost of about $1\frac{3}{4}$ million pounds sterling. Under this scheme the waters of the streams draining into Botany Bay were intercepted and pumped into three reservoirs, whence the city was supplied with water for over 30 years.

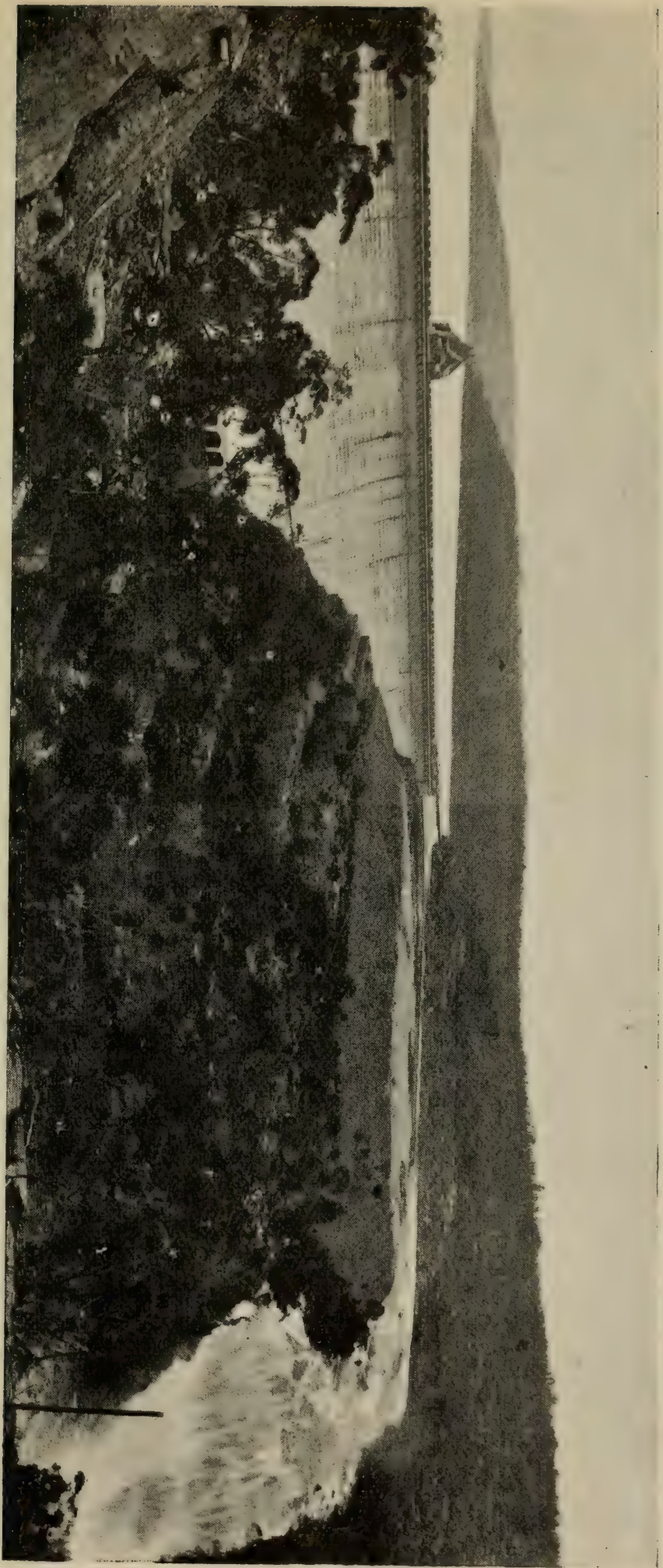
In course of time it was recognised that the Botany scheme was fast becoming inadequate to meet the requirements of a large and rapidly growing city, so that after much discussion and inquiry, what is now known as the UPPER NEPEAN SCHEME of city water supply was determined upon.

In 1888, the works in connection with this scheme had so far progressed, that the Government determined to place the control of the water and sewerage systems of the County of Cumberland under the control of an independent body, and so established by Act of Parliament the Metropolitan Board of Water Supply and Sewerage.

This Board (which is under the general supervision of the Minister for Works) consists of seven members, three of whom are appointed by the Government, two by the City Council, and two by the suburban and country municipalities in the County of Cumberland.

The most important piece of work in connection with the Sydney water supply is the CATARACT DAM, a huge reservoir in the Cataract River, about 4 miles from the township of Appin. This reservoir covers 2,104 acres, and has a capacity of 20,743,200,000 gallons.

Before this dam was constructed, the only reservoir of importance in connection with the water supply of Sydney was the PROSPECT DAM (covering a space of 1,266 acres, and with a capacity of 11,029,200,000 gallons), into which ran through tunnels and canals the unstored waters of the



CATARACT DAM, WITH OUTFLOWING CATARACT RIVER IN FLOOD.

Cataract, Cordeaux and Upper Nepean Rivers. The combined catchment over these three streams is 354 square miles, and is favourably situated with regard to coastal rainfall—the catchment area of the Cataract above the impounding dam being about 50 square miles. The water, when released from the Cataract Dam, flows down the bed of the Cataract River to a diversion weir at Broughton's Pass, where it enters the previously existing tunnel, and is conveyed thence by a system of canals to the Prospect Reservoir. In traversing the steep and rocky bed of Cataract River the water is thoroughly aerated. The total distance travelled by the water from Cataract to Sydney *via* Prospect is 66½ miles, of which 21½ miles represent the distance from Prospect to Sydney.

The combined capacity of the Cataract and Prospect Dams is sufficient, with rainfall, to supply the people of Sydney and suburbs (roughly 700,000) with water for 840 days.

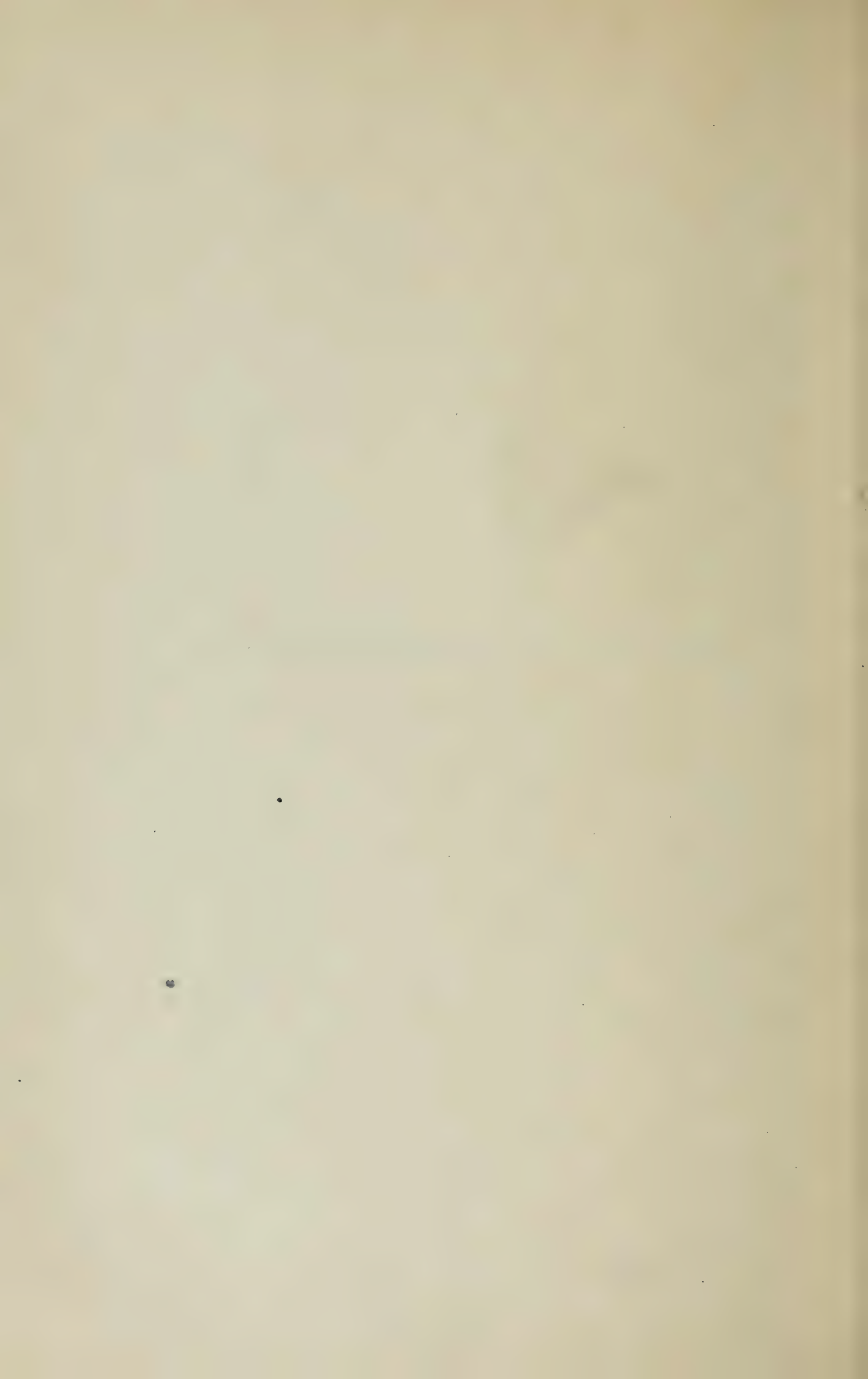
The water passes from Prospect first through cast-iron pipes, and thence into a canal five miles in length, which leads into a large basin at *Pipe Head*, 16 miles from Sydney. From Pipe Head, it is conveyed for a further distance of five miles by two wrought-iron pipes, each six feet in diameter, to the *Potts' Hill* reservoir which has a capacity of 100,000,000 gallons, covers 24½ acres, and is designed to tide the city over any interruption of supply from Prospect, and to prevent fluctuation of pressure. At Potts' Hill, the water passes through a screening tank constructed of copper-gauze screens, and thence proceeds towards the city in two 48-inch cast-iron mains. Reservoirs connected with the scheme may be seen on the heights of Crown Street, the Centennial Park, Woollahra and Waverley.

The northern suburbs receive their water supply through a 32 inch steel main from the basin at Pipe Head, discharging into a reservoir from which the water is pumped into a 1,000,000 gallon tank at Ryde, and by a continuation of the same main into two big tanks at

Chatswood, whose combined capacity is upwards of 3 million gallons.

In connection with the whole water supply of Sydney there are 32 service reservoirs, and the total cost of the scheme has reached the huge sum of £5,500,000.

W. C. Penfold & Co., Printers, 183 Pitt Street, Sydney.



CATALOGUE OF BOOKS
PUBLISHED BY
ANGUS & ROBERTSON
LIMITED

PUBLISHERS TO THE UNIVERSITY
89 CASTLEREAGH STREET, SYDNEY



All the books in this Catalogue may be obtained through any Bookseller at published price.

Intending purchasers are requested to write direct to Messrs. Angus and Robertson Limited if they have any difficulty in obtaining the books required.

The costs of postage stated herein apply only to the Commonwealth of Australia.

The more important of Messrs. Angus and Robertson's publications may be obtained in London from the Australian Book Company, 21 Warwick Lane, E.C.

August, 1911

ANNOUNCEMENTS.

THE BUSH, MY LOVER.

A Collection of Essays descriptive of the Bush and its charms for the Nature-Lover. By AMY E. MACK, author of "A Bush Calendar" and "Bushland Stories." With numerous illustrations. Square 8vo., cloth, 3s. 6d. (*postage 1d.*)

[*Shortly.*]

DAIRYING IN AUSTRALASIA: Farm and Factory.

By M. A. O'CALLAGHAN, Chief of Dairy Branch, Department of Agriculture, New South Wales. With about 150 full-page and other illustrations. Royal 8vo., cloth.

[*Shortly.*]

GARMENT CUTTING FOR GIRLS.

A Course of Scientific Garment Cutting for Schools. By M. E. ROBERTS, Lecturer at Sydney Technical College, author of "The Cutter's Guide." With 50 diagrams. Crown 4to., boards, 2s. 6d. (*postage 1d.*)

[*Shortly.*]

A VOLUME OF HUMOROUS PROSE AND VERSE.

By VICTOR J. DALEY. With coloured cover. Crown 8vo. (*Commonwealth Series*), 1s. (*postage 1d.*)

[*Shortly.*]

WINE AND ROSES: A New Volume of Poems.

By VICTOR J. DALEY. With portrait. Crown 8vo., cloth gilt, gilt top, 5s. (*postage 2d.*)

DAILY TELEGRAPH: "Most of his verse is tinged with sadness—as in most Irish poetry—but there is a fine imaginative quality that lifts it to a far higher plane than that of the conventional melancholy rhymers. There are poems in this book that recall the magic of Rossetti. . . . Victor Daley has left his mark in the beginnings of an Australian literature."

SYDNEY MORNING HERALD: "As a verse writer he undoubtedly takes a high place in Australian poetry."

REGISTER (Adelaide): "Confirms the estimate long since accepted and established—Daley was a true poet, but an Australian by accident only."

NEW ZEALAND HERALD: "He was one of the sweetest and truest singers in Australia, and the regret must be that he did so little while capable of so much."

OTAGO WITNESS: "Is full of gems and shows the charm and ideality, the grace and polish which made its lamented author so great a favourite with his brothers of the pen."

AT DAWN AND DUSK: POEMS.

By VICTOR J. DALEY. Third edition. With photogravure portrait. Crown 8vo., cloth gilt, gilt top, 5s. (*postage 2d.*)

BOOKMAN: "These verses are full of poetic fancy musically expressed."

SYDNEY MORNING HERALD: "The indefinable charm is here, and the spell, and the music. . . . A distinct advance for Australian verse in ideality, in grace and polish, in the study of the rarer forms of verse, and in the true faculty of poetic feeling and expression."

BULLETIN: "Open this book where you will, you are caught at once into a land of dreams."

COURIER (Brisbane): Mr. Daley's dreams will be cherished in the years to be. Their charm is not of the evanescent order."

FREEMAN'S JOURNAL: "There is in it a richness of thought, a power of language, and an originality of purpose unique amongst Australian poets."

THE MAN FROM SNOWY RIVER, AND OTHER VERSES.

By A. B. PATERSON. Forty-sixth thousand. With photogravure portrait and vignette title. Crown 8vo., cloth gilt, gilt top, 5s. (*postage 2d.*)

THE LITERARY YEAR BOOK: "The immediate success of this book of bush ballads is without parallel in Colonial literary annals, nor can any living English or American poet boast so wide a public, always excepting Mr. Rudyard Kipling."

ATHENAEUM: "Swinging, rattling ballads of ready humour, ready pathos, and crowding adventure. . . . Stirring and entertaining ballads about great rides, in which the lines gallop like the very hoofs of the horses."

THE TIMES: "At his best he compares not unfavourably with the author of 'Barrack-Room Ballads.'"

THE SCOTSMAN: "A book like this . . . is worth a dozen of the aspiring, idealistic sort, since it has a deal of rough laughter and a dash of real tears in its composition."

London: Macmillan and Co., Limited.

RIO GRANDE'S LAST RACE, AND OTHER VERSES.

By A. B. PATERSON. Eleventh thousand. Crown 8vo., cloth gilt, gilt top, 5s. (*postage 2d.*)

SPECTATOR: "There is no mistaking the vigour of Mr. Paterson's verse; there is no difficulty in feeling the strong human interest which moves in it."

BOOKMAN: "Now and again a deeper theme, like an echo from the older, more experienced land, leads him to more serious singing, and proves that real poetry is, after all, universal. It is a hearty book."

GLASGOW HERALD: "These are all entertaining, their rough and ready wit and virility of expression making them highly acceptable, while the dash of satire gives point to the humour."

BRITISH AUSTRALASIAN: "He catches the bush in its most joyous moments, and writes of it with the simple charm of an unaffected lover."

THE TIMES: "Will be welcome to that too select class at home who follow the Australian endeavour to utter a fresh and genuine poetic voice."

London: Macmillan and Co., Limited.

THE POETICAL WORKS OF BRUNTON STEPHENS.

New edition. With photogravure portrait. Crown
8vo., cloth gilt, gilt top, 5s. (*postage 2d.*)

See also Commonwealth Series, page 16.

THE TIMES: "This collection of the works of the Queensland poet, who has for a generation deservedly held a high place in Australian literature, well deserves study."

DAILY NEWS: "In turning over the pages of this volume, one is struck by his breadth, his versatility, his compass, as evidenced in theme, sentiment, and style."

THE ATHENAEUM: "Brunton Stephens . . . well known to all those who are curious in Australian literature, as being, on the whole, the best of Australian poets."

HOW HE DIED, AND OTHER POEMS.

By JOHN FARRELL. Third edition. With Memoir, Appreciations, and photogravure portrait. Crown
8vo., cloth gilt, gilt top, 5s. (*postage 1d.*)

MELBOURNE AGE: "Farrell's contributions to the literature of this country were always distinguished by a fine, stirring optimism, a genuine sympathy, and an idealistic sentiment, which in the book under notice find their fullest expression."

NEW ZEALAND MAIL: "Of the part of Mr. Farrell's work contained in this volume it is not necessary to say more than that it has long since received sincere commendation, not only from other Australian writers, but from men eminent in letters in England and America."

THE SECRET KEY AND OTHER VERSES.

By GEORGE ESSEX EVANS. With portrait. Crown
8vo., cloth gilt, gilt top, 5s. (*postage 2d.*)

GLASGOW HERALD: "There is . . . the breath of that apparently immortal spirit which has inspired . . . almost all that is best in English higher song."

THE BOOKMAN: "Mr. Evans has written many charming and musical poems, . . . many pretty and haunting lines."

THE GOLDEN TREASURY OF AUSTRALIAN VERSE.

Edited, with Introduction and Notes, by BERTRAM STEVENS. Crown 8vo, cloth gilt, gilt top, 5s. (*postage 2d.*)

ARGUS: "It is a vast improvement on its predecessor. Certain copyright restrictions have been removed, and Mr. Stevens has been allowed to help himself to some excellent work which was inaccessible to him three years ago . . . Mr. Stevens has shown himself once more a man of excellent taste and discrimination, and has laid lovers of poetry who also love Australia under a heavy obligation to him for this most pleasant book."

SYDNEY MORNING HERALD: "The selection is thoroughly characteristic and it includes young writers who have not so far appeared in book form."

THE AUSTRALASIAN: "Mr. Stevens has rightly included in the book good pieces by authors who have produced comparatively few poems . . . and has shown excellent taste in his selection."

REGISTER (Adelaide): "The volume is a fine tribute to the lyrical powers of a practical and poet-loving nation."

MELBOURNE PUNCH: "This book will be prized by thousands."

London: Macmillan and Co., Limited.

THE AUSTRALIAN BIRTHDAY BOOK.

Passages selected from Australian and New Zealand poetry, edited by BERTRAM STEVENS. Crown 16mo., limp morocco, gilt edges, 3s. 6d. (*postage 2d.*)

SYDNEY MORNING HERALD: "The poetical quotations form a choice anthology of Australian verse . . . The book should have a special claim for Australian use."

DAILY TELEGRAPH: "A dainty little volume . . . The selections have been carefully made, and the little book is a collection of poetic flowers of the soil as well as an autograph album."

FAIR GIRLS AND GRAY HORSES, WITH OTHER VERSES.

By WILL. H. OGILVIE. Fifteenth thousand. With portrait. Crown 8vo., cloth gilt, gilt top, 5s. (*postage 2d.*)

SCOTSMAN: "Its verses draw their natural inspiration from the camp, the cattle trail, and the bush; and their most characteristic and compelling rhythms from the clatter of horses' hoofs."

SPECTATOR: "Nothing could be better than his bush ballads, and he writes of horses with the fervour of Lindsay Gordon."

GLASGOW HERALD: "Mr. Ogilvie sings with a dash and a lilt worthy of the captains of Australian song . . . Whoever reads these verses holds the key to all that is attractive in the life that is characteristically Australian."

GLASGOW DAILY MAIL: "A volume which deserves a hearty welcome is this collection of Australian verse . . . It has a spirit and lyrical charm that make it very enjoyable."

NOTTINGHAM GUARDIAN: "The author's rhymes have a merry jingle, and his lines move with a zest and stir which make them altogether enjoyable."

HEARTS OF GOLD AND OTHER VERSES.

By WILL H. OGILVIE, author of "Fair Girls and Gray Horses." Third thousand. Crown 8vo., cloth, 4s. 6d. (*postage 2d.*)

SONGS OF A SUNLIT LAND.

By COLONEL KENNETH MACKAY, C.B. With portrait. Crown 8vo., cloth gilt, 3s. 6d. (*postage 1d.*)

TO-MORROW:

A Dramatic Sketch of the Character and Environment of Robert Greene.

By J. LE GAY BRERETON. Royal 16mo., wrapper, 1s. 6d. (*postage 1d.*)

WHEN THE WORLD WAS WIDE, AND OTHER VERSES.

By HENRY LAWSON. Fourteenth thousand. With photogravure portrait and vignette title. Crown 8vo., cloth gilt, gilt top, 5s. (*postage 2d.*)

THE ACADEMY: "These ballads (for such they mostly are) abound in spirit and manhood, in the colour and smell of Australian soil. They deserve the popularity which they have won in Australia, and which, we trust, this edition will now give them in England."

THE SPEAKER: "There are poems in 'In the Days When the World was Wide' which are of a higher mood than any yet heard in distinctively Australian poetry."

LITERARY WORLD: "Not a few of the pieces have made us feel discontented with our sober surroundings, and desirous of seeing new birds, new landscapes, new stars; for at times the blood tingles because of Mr. Lawson's galloping rhymes."

NEWCASTLE WEEKLY CHRONICLE: "Swinging, rhythmic verse."

WHEN I WAS KING, AND OTHER VERSES.

By HENRY LAWSON. Seventh thousand. Crown 8vo., cloth gilt, 3s. 6d. (*postage 2d.*)

Also in two parts, entitled "When I Was King," and "The Elder Son." See page 16.

SPECTATOR (London): "A good deal of humour, a great deal of spirit, and a robust philosophy are the main characteristics of these Australian poets. Because they write of a world they know, and of feelings they have themselves shared in, they are far nearer the heart of poetry than the most accomplished devotees of a literary tradition."

SYDNEY MORNING HERALD: "He is known wherever the English language is spoken; he is the very god of the idolatry of Australian bushmen; . . . he has written more and is better known than any other Australian of his age . . . There is a musical lilt about his verses which makes these dwell in the memory, and there is in them also a revelation of truth and strength . . . 'When I Was King' contains work of which many a craftsman in words might well be proud . . . lines that Walt Whitman—a master of rhythm when he liked, and a worshipper of it always—would have been proud to claim as his own."

VERSES, POPULAR AND HUMOROUS.

By HENRY LAWSON. Sixteenth thousand. Crown 8vo., cloth gilt, 3s. 6d. (*postage 2d.*)

For cheaper edition see Commonwealth Series, page 16.

FRANCIS THOMPSON, in THE DAILY CHRONICLE: "He is a writer of strong and ringing ballad verse, who gets his blows straight in, and at his best makes them all tell. He can vignette the life he knows in a few touches, and in this book shows an increased power of selection."

NEW YORK EVENING JOURNAL: "Such pride as a man feels when he has true greatness as his guest, this newspaper feels in introducing to a million readers a man of ability hitherto unknown to them. Henry Lawson is his name."

ACADEMY: "Mr. Lawson's work should be well known to our readers, for we have urged them often enough to make acquaintance with it. He has the gift of movement, and he rarely offers a loose rhyme. Technically, short of anxious lapidary work, these verses are excellent. He varies sentiment and humour very agreeably."

THE BOOK LOVER: "Any book of Lawson's should be bought and treasured by all who care for the real beginnings of Australian literature. As a matter of fact, he is the one Australian literary product, in any distinctive sense."

THE BULLETIN: "He is so very human that one's humanity cannot but welcome him . . . To the perpetuation of his value and fame, many pieces in 'Verses, Popular and Humorous' will contribute."

JOE WILSON AND HIS MATES.

By HENRY LAWSON. Ninth thousand. Crown 8vo., cloth gilt, 3s. 6d. (*postage 2d.*)

For cheaper edition see Commonwealth Series, page 16.

THE ATHENAEUM (London): "This is a long way the best work Mr. Lawson has yet given us. These stories are so good that (from the literary point of view of course) one hopes they are not autobiographical. As autobiography they would be good, as pure fiction they are more of an attainment."

THE ACADEMY: "It is this rare convincing tone of this Australian writer that gives him a great value. The most casual 'newspapery' and apparently artless art of this Australian writer carries with it a truer, finer, more delicate commentary on life than all the idealistic works of any of our genteel school of writers."

ON THE TRACK AND OVER THE SLIPRAILS.

By HENRY LAWSON. Eighteenth thousand. Crown 8vo., cloth gilt, 3s. 6d. (*postage 2d.*)

For cheaper edition see Commonwealth Series, page 16.

DAILY CHRONICLE: "Will well sustain the reputation its author has already won as the best writer of Australian short stories and sketches the literary world knows."

PALL MALL GAZETTE: "The volume now received will do much to enhance the author's reputation. There is all the quiet irresistible humour of Dickens in the description of 'The Darling River,' and the creator of 'Truthful James' never did anything better in the way of character sketches than Steelman and Mitchell."

GLASGOW HERALD: "Mr. Lawson must now be regarded as *facile princeps* in the production of the short tale. Some of these brief and even slight sketches are veritable gems that would be spoiled by an added word, and without a word that can be looked upon as superfluous."

SYDNEY MORNING HERALD: "It is not too much to say for these sketches that they show an acquaintance with bush life and an insight into the class of people which is to be met with in this life that are hardly equalled in Australia . . . In a few words he can paint for you the landscape of his pictures or the innermost recesses of his bushman's soul."

CHILDREN OF THE BUSH.

By HENRY LAWSON. Eighth thousand. Crown 8vo., cloth gilt, 3s. 6d. (*postage 2d.*)

Also in two parts, entitled "Send Round the Hat" and "The Romance of the Swag." See page 16.

DAILY TELEGRAPH: "These stories are for the most part episodes which appear to have been taken direct from life . . . and Mr. Lawson contrives to make them wonderfully vivid . . . Mr. Lawson's new stories are as good as his old ones, and higher praise they could not get."

THE BULLETIN: "These stories are the real Australia, written by the foremost living Australian author . . . Lawson's genius remains as vivid and human as when he first boiled his literary billy."

NEW ZEALAND TIMES: "His latest work, so far from exhibiting any signs of failing talent, seems to us to rank amongst the best he has yet done."

WHILE THE BILLY BOILS.

By HENRY LAWSON. With eight illustrations by F. P. Mahony. Thirtieth thousand. Crown 8vo., cloth gilt, 3s. 6d. (*postage 2d.*)

For cheaper edition see Commonwealth Series, page 16.

THE ACADEMY: "A book of honest, direct, sympathetic, humorous writing about Australia from within is worth a library of travellers' tales . . . The result is a real book—a book in a hundred. His language is terse, supple, and richly idiomatic. He can tell a yarn with the best."

THE SCOTSMAN: "There is no lack of dramatic imagination in the construction of the tales; and the best of them contrive to construct a strong sensational situation in a couple of pages. But the chief charm and value of the book is its fidelity to the rough character of the scenes from which it is drawn."

LITERATURE: "These sketches bring us into contact with one phase of colonial life at first hand . . . The simplicity of the narrative gives it almost the effect of a story that is told by word of mouth."

THE RISING OF THE COURT, AND OTHER SKETCHES IN PROSE AND VERSE.

By HENRY LAWSON With coloured cover by Lionel Lindsay. Crown 8vo., wrapper (*Commonwealth Series*), 1s. (*postage 1d.*)

QUEENSLAND TIMES: "These stories show Lawson at his best, and Lawson at his best is not to be beaten by short story writers in current literature."

EXAMINER (Launceston): "We all know the originality, the freshness, and the vigour of his style, and these characteristics are still splendidly maintained. . . . Eight prose sketches and a similar number in verse, all breathing the atmosphere of Australian bush life, and representing the rugged types that Mr. Lawson loves to limn with his facile and versatile pen."

WEEKLY PRESS (Christchurch): "No one else could have written most of these sketches. Lawson has so much feeling and so much humour."

THE GARDEN OF KAMA, AND OTHER LOVE LYRICS.

By LAURENCE HOPE. Special edition for Australia.
5s. (*postage 3d.*)

DAILY CHRONICLE: "No one has so truly interpreted the Indian mind—no one, transcribing Indian thought into our literature, has retained so high and serious a level, and quite apart from the rarity of themes and setting—the verses remain—true poems."

STARS OF THE DESERT.

By LAURENCE HOPE. Special edition for Australia.
5s. (*postage 3d.*)

OUTLOOK: "It is not merely that these verses describe Oriental scenes and describe them with vividness, there is a feeling in the rhythm—a timbre of the words that seem akin to the sand and palm-trees and the changeless East."

INDIAN LOVE.

By LAURENCE HOPE. With portrait. Special edition for Australia. 5s. (*postage 3d.*)

SPECTATOR: "The poetry of Laurence Hope must hold a unique place in modern letters. No woman has written lines so full of a strange primeval savagery—a haunting music—the living force of poetry."

LIFE OF CHARLES STURT, AUSTRALIAN EXPLORER.

By MRS. NAPIER G. STURT. With portraits and maps.
Demy 8vo., cloth gilt, 3s. 6d. (*postage 6d.*)

BUSHLAND STORIES.

By AMY E. MACK, author of "A Bush Calendar."
With coloured illustrations. Crown 8vo., cloth,
3s. 6d. (*postage 2d.*)

ACADEMY: "It is not often that we have the pleasure to welcome from Australia a book of so many charming short stories as are contained in the volume before us. . . 'Bushland Stories' should be a somewhat original and welcome addition to the large and excellent assortment of children's books which already exist in vast and ever-growing numbers, and it will also possibly be enjoyed by many who can no longer claim to be children in regard to years."

SCOTSMAN: "Charming and simple nursery tales, appetisingly touched with local colour of the Bush."

GLASGOW HERALD: "A well-written, genially conceived series of nature stories, unencumbered by any intrusively didactic quality."

BIRMINGHAM DAILY POST: "There is a daintiness and distinct charm in these fairy tales. It was certainly a happy notion to confer the gift of speech on the birds and flowers and fish of Australia for the benefit of young readers, and the authoress has carried it out admirably."

A BUSH CALENDAR.

By AMY E. MACK. With 42 illustrations from Nature.
Cloth, 3s 6d. (*postage 1d.*)

SELBORNE MAGAZINE: "It is with a pleasing sense of surprise that we read Mrs. Harrison's brightly-written studies of Nature as she is seen by the seeing eye."

LITERARY WORLD: "A pleasant little book . . . There is much to interest those who have no personal knowledge of the antipodes . . . and to those who know the country, the vivid descriptions will bring back many happy recollections."

PUBLISHERS' CIRCULAR: "Full of charm and attractiveness."

COUNTRY LIFE: "The writer portrays so charmingly the moods of the seasons that, open the book where one will, it cannot fail to bring back a flood of memories to anyone who has known or felt the glamour of the Bush."

KNOWLEDGE: "Will appeal to all lovers of out-door natural history."

THE EMU: "Her charming little volume . . . appeals not alone to nature-lovers, but to every lover of pleasant books. . . . Each month brings its pageant of beauty, and our author has gathered of the garlands to deck the Austral months."

DOT AND THE KANGAROO.

By ETHEL C. PEDLEY. Illustrated by F. P. Mahony.
Eighth thousand. Crown 8vo., cloth gilt, 2s. 6d.
(*postage 2d.*)

SYDNEY MORNING HERALD: " ' Dot and the Kangaroo ' is without doubt one of the most charming books that could be put into the hands of a child. It is admirably illustrated by Frank P. Mahony, who seems to have entered thoroughly into the animal world of Australia. The story is altogether Australian. . . . It is told so simply, and yet so artistically, that even the 'grown-ups' amongst us must enjoy it."

AN OUTBACK MARRIAGE: A Story of Australian Life.

By A. B. PATERSON, author of "The Man from Snowy River," and "Rio Grande's Last Race." Seventh thousand. Crown 8vo., cloth gilt, 3s. 6d. (*postage 2d.*)

For cheaper edition see Commonwealth Series, page 16.

SCOTSMAN: "The chief virtue of the book lies in its fresh and vivid presentment of the wild life and the picturesque manners of the Australian bush, while in form and style it claims recognition as a work of considerable literary distinction."

PALL MALL GAZETTE: "The whole tone of the book is fresh and breezy . . . Altogether, this is a distinctly interesting story."

GLASGOW HERALD: ". . . . will stand comparison with works of fiction produced in any part of the English-speaking world."

THE OLD BUSH SONGS.

Collected and edited by A. B. PATERSON, author of "The Man from Snowy River," "Rio Grande's Last Race," &c. Seventh thousand. Crown 8vo., cloth gilt, 2s. 6d. (*postage 1d.*)

For cheaper edition see Commonwealth Series, page 16.

DAILY TELEGRAPH: "Rude and rugged these old bush songs are, but they carry in their vigorous lines the very impress of their origin and of their genuineness . . . Mr. Paterson has done his work like an artist."

THE COMMONWEALTH SERIES.

Crown 8vo., picture cover, 1s. each (*postage 1d.*)

- THE RISING OF THE COURT: A NEW VOLUME OF
PROSE AND VERSE SKETCHES. *By Henry Lawson*
- SEND ROUND THE HAT: STORIES. *By Henry Lawson*
- THE ROMANCE OF THE SWAG: STORIES. *By Henry Lawson*
- WHEN I WAS KING: VERSES. *By Henry Lawson*
- THE ELDER SON: VERSES. *By Henry Lawson*
- JOE WILSON: STORIES. *By Henry Lawson*
- JOE WILSON'S MATES: STORIES *By Henry Lawson*
- ON THE TRACK: STORIES. *By Henry Lawson*
- OVER THE SLIPRAILS: STORIES. *By Henry Lawson*
- POPULAR VERSES. *By Henry Lawson*
- HUMOROUS VERSES. *By Henry Lawson*
- WHILE THE BILLY BOILS: STORIES—First Series.
By Henry Lawson
- WHILE THE BILLY BOILS: STORIES—Second Series.
By Henry Lawson
- AN OUTBACK MARRIAGE. *By A. B. Paterson*
- THE OLD BUSH SONGS. *Edited by A. B. Paterson*
- MY CHINEE COOK, AND OTHER HUMOROUS VERSES.
By Brunton Stephens
- HISTORY OF AUSTRALIAN BUSHRANGING. *By Charles White*
- Part I.—The Early Days.
Part II.—1850 to 1862.
Part III.—1863 to 1869.
Part IV.—1869 to 1878.

∴ *For press notices of these books see the cloth-bound editions on pages 6, 9, 10, 11, 12, 15, and 18 of this Catalogue.*

THE INFERNO OF DANTE ALIGHIERI.

Literally translated into English verse in the measure of the original, by the Right Hon. Sir SAMUEL WALKER GRIFFITH, G.C.M.G., M.A., Chief Justice of the High Court of Australia. Crown 8vo., cloth gilt, 6s. (*postage 2d.*)

NOTES AND QUERIES: "The version before us gives a better idea of the original than many more ambitious efforts; it will bear comparison both with the original text and with Longfellow's, on which it improves occasionally in the matter of diction . . . The correctness of the work is a matter for congratulation, for some of the latest translators have made mistakes in rendering the Italian as well as introducing needlessly fanciful paraphrases . . . We hope Sir Samuel Griffith may find time to add the *Purgatorio* and *Paradiso* to this volume. Since Bowen's work on Virgil, we remember no worthy manifestation of the literary judge, who seems, alas! to be as rare nowadays as the literary bishop."

LAW AND LIBERTY.

A Manual of the Elements of Political Economy for the Use of Statesmen, Teachers, and Students. By ALEXANDER W. JOHNSTON, M.A. Crown 8vo., cloth gilt, 2s. 6d. (*postage 2d.*)

THE AGE: "Worthy of commendation, for it introduces freshness into a heavy but important subject . . . As a series of concise pronouncements which convey ideas and induce thought it is well worth reading."

RACIAL DECAY:

A Compilation of Evidence from World Sources.

By OCTAVIUS C. BEALE, A Commissioner of the Commonwealth of Australia, 1907, and of the State of New South Wales, 1903. With numerous diagrams. Crown 4to., cloth, 5s. (*postage 3d.*)

DAILY TELEGRAPH: "A positively monumental accumulation of fact and quotation and argument on this gravest of all subjects."

REGISTER (Adelaide): "The public should feel deep gratitude to him for his earnest and able campaign against the greatest evil of the age."

THE GEOLOGY OF SYDNEY AND THE BLUE MOUNTAINS:

A popular introduction to the study of Australian Geology.

By Rev. J. MILNE CURRAN, late Lecturer in Chemistry and Geology, Technical College, Sydney. Second edition. With a Glossary of Scientific Terms, a Reference List of commonly-occurring Fossils, 2 coloured maps, and 83 illustrations. Crown 8vo., cloth gilt, 6s. (*postage 2d.*)

NATURE: "This is, strictly speaking, an elementary manual of geology. The general plan of the work is good; the book is well printed and illustrated with maps, photographic pictures of rock structure and scenery, and figures of fossils and rock sections."

SATURDAY REVIEW: "His style is animated and inspiring, or clear and precise, as occasion demands. The people of Sydney are to be congratulated on the existence of such a guide to their beautiful country."

HISTORY OF AUSTRALIAN BUSHRANGING.

By CHARLES WHITE. In two vols. Crown 8vo., cloth gilt, 3s. 6d. each (*postage 2d. each*).

Vol. I.—The Early Days to 1862. Eleventh thousand.

Vol. II.—1863 to 1878. Tenth thousand.

See also Commonwealth Series, page 16.

YEAR BOOK OF AUSTRALIA: "The bushrangers have long since left the stage of Australian history, but their evil deeds live after them, and are likely to do so for many years to come. Having collected all the published details relating to the career of the Tasmanian as well as the Australian gangs, Mr. White has reduced them to a very readable narrative, which may fairly be termed a history. In this shape it forms a valuable contribution to the general history of the country, especially as a picture of social life in the past."

QUEENSLANDER: "Mr. White has supplied material enough for twenty such novels as 'Robbery Under Arms.'"

HISTORY OF AUSTRALASIA:

From the Earliest Times to the Present Day, with a Chapter on Australian Literature.

By ARTHUR W. JOSE, author of "The Growth of the Empire." Fourth edition, revised and enlarged, with many new maps and illustrations. Crown 8vo., cloth gilt, 3s. 6d. (*postage 2d.*)

THE BULLETIN: "It is the most complete handbook on the subject available; the tone is judicial and the workmanship thorough . . . The new chapter on Australian Literature is the best view yet presented."

DAILY TELEGRAPH: "There was ample room for a cleverly condensed, clear, and yet thoroughly live account of these colonies such as Mr. Jose now presents us with."

SYDNEY MORNING HERALD: "Possibly we have not yet reached the distance in point of time from the events here recorded to permit the writing of a real history of Australasia; but Mr. Jose has done good work in the accumulation and orderly arrangement of details, and the intelligent reader will derive much profit from this little book."

THE STORY OF WILLIAM DAMPIER.

By J. H. M. ABBOTT, author of "Tommy Cornstalk," etc. With portrait. Crown 8vo., cloth, 1s. (*postage 1d.*)

SYDNEY MORNING HERALD: "These little books are intended to familiarise young Australians with the early history of their continent, and if all the authors hit on as happy a style as Mr. Abbott has done they should prove as popular as they are useful."

THE STORY OF W. C. WENTWORTH: AUSTRALIA'S FIRST PATRIOT.

By LEWIS DEER and JOHN BARR. With portrait and illustrations. Crown 8vo., cloth, 1s. (*postage 1d.*)

DAILY TELEGRAPH: "An admirably-written biography, suitable for use as a reader in the higher classes of schools. They have jointly presented the main facts in the career of Wentworth with historical accuracy, as well as in capital literary style."

BULLETIN: "Is intended for school children and will be of great value to them. It will also supply the general reader with a concise and impartial account of Wentworth's career which cannot be obtained elsewhere. The authors have done their work well."

THE ANNOTATED CONSTITUTION OF THE AUSTRALIAN COMMONWEALTH.

By Sir JOHN QUICK, LL.D., and R. R. GARRAN, C.M.G.
Royal 8vo., cloth gilt, 21s.

THE TIMES: "The Annotated Constitution of the Australian Commonwealth is a monument of industry . . . Dr. Quick and Mr. Garran have collected with patience and enthusiasm every sort of information, legal and historical, which can throw light on the new measure. The book has evidently been a labour of love."

THE LAW OF LANDLORD AND TENANT IN NEW SOUTH WALES.

By J. H. HAMMOND, B.A., LL.B., and C. G. W. DAVIDSON, B.A., LL.B., Barristers-at-Law. Demy 8vo., cloth, 7s. 6d. (*postage 3d.*)

SYDNEY MORNING HERALD: "... a valuable contribution to legal literature . . . The authors have incorporated the various Statutes in force in the State, annotating them with care, precision, and judgment. The notes and references have relation, not only to decisions in this and the other States of the Commonwealth, but also to English decisions under Statutes held to be in force in New South Wales . . . The value of the work, which bears evidence of close and careful research, is enhanced by the fact that hitherto there has been no text-book which completely embraced the subject."

THE JUSTICES' MANUAL AND POLICE GUIDE.

A Synopsis of offences punishable by indictment and on summary conviction, definitions of crimes, meanings of legal phrases, hints on evidence, procedure. police duties, &c., in New South Wales.

Compiled by DANIEL STEPHEN, Senior-Sergeant of Police. Second edition. Crown 8vo., cloth gilt, 6s. (*postage 2d.*)

SYDNEY MORNING HERALD: "Justices of the Peace and others concerned in the administration of the law will find the value of this admirably-arranged work . . . We had nothing but praise for the first edition, and the second edition is better than the first."

CALENDAR OF THE UNIVERSITY OF SYDNEY.

Demy 8vo., linen, 2s. 6d.; paper cover, 1s. (*postage 3d.*)
[*Published annually in June.*]

MANUAL OF PUBLIC EXAMINATIONS HELD BY THE UNIVERSITY OF SYDNEY.

Demy 8vo., paper cover, 1s. (*postage 1d.*)
[*Published annually in September, and dated the year following that in which it is issued.*]

AN INTRODUCTION TO THE INFINITESIMAL CALCULUS.

By H. S. CARSLAW, M.A., D.Sc., F.R.S.E., Professor of Mathematics in the University of Sydney.
Demy 8vo., cloth gilt, 5s. (*postage 2d.*)

THE TIMES: "Concise lucidity is the key-note of the book. . . . Professor Carslaw may be congratulated upon having produced an admirable book, which should be useful to young engineers and science students, both during and after their college courses."

PRACTICAL PHYSICS.

By J. A. POLLOCK, Professor of Physics, and O. U. VONWILLER, Demonstrator in Physics, in the University of Sydney. Part I. With 30 diagrams.
8vo., paper cover, 3s. 9d. (*postage 2d.*)

ABRIDGED MATHEMATICAL TABLES.

By S. H. BARRACLOUGH, B.E., M.M.E., Assoc. M. Inst. C.E. Demy 8vo., cloth, 1s. (*postage 1d.*)

Logarithms, &c., published separately, price 6d. (*postage 1d.*)

IRRIGATION WITH SURFACE AND SUBTER- RANEAN WATERS, AND LAND DRAINAGE.

By W. GIBBONS COX, C.E. With 81 illustrations and
a coloured map of Australia. Crown 8vo., cloth
gilt, 3s. 6d. (*postage 2d.*)

THE AUSTRALASIAN: "The work under notice, which has
special reference to the utilisation of artesian and sub-artesian
water, is the most valuable contribution to the literature on
the subjects dealt with that has yet appeared in Australia."

SYDNEY MORNING HERALD: "The chief value of the book will
be, perhaps, for the individual irrigationist. The author goes
into detail on most phases of small schemes . . . He takes
various crops and fruit trees separately, and gives a lot of
sound information on the question. The sinking of wells, the
erection of reservoirs, ditches, checks, and grading are all con-
sidered."

THE HOME DOCTORING OF ANIMALS.

By HAROLD LEENEY, M.R.C.V.S. Fourth edition,
thoroughly revised and greatly enlarged, with
nearly 100 illustrations. 8vo., cloth, 12s. 6d.
(*postage 8d.*)

CONTENTS.—I. Diseases of the Blood—II. Diseases of the
Heart—III. Diseases of the Digestive System—IV. Tumours—
V. Diseases of the Respiratory Organs—VI. Diseases of the
Eye—VII. Diseases of the Brain and Nervous System—VIII.
Diseases of the Generative Organs—IX. Diseases connected with
Parturition—X. Troubles of the New Born—XI. Skin Diseases
—XII. Parasites and Parasitic Diseases—XIII. Diseases of the
Foot—XIV. Lameness and Bone Diseases—XV. Wounds and
their Treatment—XVI. Bleeding: How to arrest Bleeding and
how to Classify—XVII. Operations: Such as Castrating and
Docking—XVIII. Blisters, Blistering, Firing, Setons, Seton-
ing—XIX. Poisons and Antidotes—XX. Antiseptics and Disin-
fectants—XXI. Anæsthesia, Insensibility to Pain—XXII.
Physicking, Purging Horses, Cattle, Sheep, Pigs, Dogs, and
Cats—XXIII. Diseases of Poultry—XXIV. Administration of
Medicines—XXV. Medicines: A Comprehensive Series of Pre-
scriptions—XXVI. Nursing and Foods for the Sick—XXVII.
Methods of Control or Trammelling Animals—XXVIII. Vices,
Tricks, and Bad Habits of the Horse.

THE PLANTS OF NEW SOUTH WALES:

An Analytical Key to the Flowering Plants (except Grasses and Rushes) and Ferns of the State, set out in an original method, with a list of native plants discovered since 1893.

By W. A. DIXON, F.I.C., F.C.S. With Glossary and 49 diagrams. Foolscap 8vo., cloth gilt, 3s. 6d. (*postage 2d.*)

NATURE: "This is a handy little book providing a compact guide for naming flowers in the field . . . The author lays stress on the extensive use made of vegetative characters for identification, with which there can be only entire agreement so long as the characters are determinative."

DAILY TELEGRAPH: "The author has succeeded in bringing his subject within the comprehension of the ordinary observer. In a concise introductory note, Mr. Dixon points out the difficulty of identifying plants by the use of scientific treatises, and substitutes a system based on the use of more easily observed characters."

SYDNEY MORNING HERALD: "The book is interesting as well as ingenious. It is a valuable contribution to the botanic literature of Australia."

SIMPLE TESTS FOR MINERALS.

By JOSEPH CAMPBELL, M.A., F.G.S., M.I.M.E. Fourth edition, revised and enlarged (completing the tenth thousand). With illustrations. Cloth, round corners, 3s. 6d. (*postage 1d.*)

BALLARAT STAR: "This is an excellent little work, and should be in the hands of every scientific and practical miner."

BENDIGO EVENING MAIL: "Should be in every prospector's kit. It enables any intelligent man to ascertain for himself whether any mineral he may discover has a commercial value."

BUNDABERG STAR: "A handy and useful book for miners and all interested in the mining industry."

NEWCASTLE MORNING HERALD: "The book is a thoroughly practical one."

WYALONG STAR: "Now it will be possible for miners and prospectors to test any mineral which has a commercial value."

THE CUTTER'S GUIDE.

A Manual of Dresscutting and Ladies' Tailoring. By M. E. ROBERTS, Lecturer at Sydney Technical College. Second edition, revised and enlarged, with 133 diagrams. Crown 4to., cloth gilt, 7s. 6d. (*postage 2d.*)

TAILORS' ART JOURNAL: "To all those inquirers from whom we have had continued correspondence asking for information as to the ways and means of perfecting their knowledge in the rudiments of ladies' dressmaking and tailoring, we can safely say that no book is better suited for their purpose than this."

WOMAN'S BUDGET: "So simple are the directions given that the book has only to be known to find a place in all houses where the women-folk are anxious to understand the useful art of dresscutting."

TOWN AND COUNTRY JOURNAL: "These lectures have been printed in book form in response to many appeals from students and ex-students, to whom this system commends itself, because it is easy to learn, accurate, and reliable, and because there are neither charts, machines, nor other mechanical appliances to purchase. To the girl who needs the means to earn a livelihood this book will prove invaluable, as it contains the fruits of years of practical work."

THE PRINCIPLES AND PRACTICE OF BOILER CONSTRUCTION:

A Manual of Instruction and Useful Information for Practical Men.

By W. D. CRUICKSHANK, M. I. Mech. E., late Chief Engineering Surveyor, New South Wales Government. Second edition, revised and enlarged, with 70 illustrations. 8vo., cloth gilt, 15s. (*postage 3d.*)

THE TIMES (Engineering Supplement): "Mr. Cruickshank has given a useful work to boiler designers and superintendents. . . . There is a 'handiness' in the arrangement of the subjects which enables the reader to locate any subject quickly."

JOURNAL OF THE MARINE ENGINEERS' ASSOCIATION: "A practical treatise on the construction and management of steam boilers, and will be found of great value to practical engineers."

EVERY WOMAN HER OWN DRESSMAKER:

The Moulding Method of Practical Dressmaking. By
MADAME BERGE, Inventor of the Moulding Method.
With 134 illustrations from photographs. Crown
8vo., cloth gilt, 3s. 6d. (*postage 3d.*)

SYDNEY MORNING HERALD: "It is a book which can be
easily understood by the most uninitiated."

COOKERY BOOK OF GOOD AND TRIED RECEIPTS.

**Compiled for the Presbyterian Women's Missionary
Association.**

Eleventh edition, enlarged, completing 120,000 copies.
Crown 8vo., cloth, 1s. (*postage 1d.*)

FIRST AID IN NURSING:

For the Bush and Country, and for use in Schools.

By MRS. W. M. THOMAS (Sister Dickson). Illustrated.
Foolscap 8vo., cloth, 1s. (*postage 1d.*)

ARGUS: "It is easy of reference and clearly expressed, so
as to be readily comprehended by everyone, and it deals with
the common troubles that almost every mother finds herself
face to face with at times. When people are far from nurses
and doctors, it is invaluable for them to have simple practical
advice from an experienced nurse ready to hand, and they
may be sure they have it if they possess this little volume."

THE NURSING OF DIPHTHERIA.

By HILDA M. LOXTON, formerly Sister-in-Charge of
Diphtheria Ward, Royal Alexandra Hospital for
Children, Sydney. With introduction by Dr.
W. F. Litchfield. Foolscap 8vo., wrapper, 1s.
(*postage 1d.*)

A JUNIOR COURSE OF FIRST AID:

For Boy Scouts, Girl Aids, and Primary Schools.

By GEORGE LANE MULLINS, M.D. With 30 illustra-
tions, 6d. (*post free 7d.*)

PROLEGOMENA TO A CENSURE OF OLD WRITERS.

By JEAN HARDOUIN, S.J. Translated by EDWIN JOHNSON, M.A. (Lond.), author of "The Rise of Christendom," "The Rise of English Culture," "Antiqua Mater," "The Pauline Epistles Restudied and Explained," etc. Crown 8vo, cloth gilt, 6s. (*postage 1d.*)

CHURCH SERVICES, FOR USE BY LAYMEN.

Prepared on the Authority of the Presbyterian Church of Australia (State of New South Wales). Foolscap 8vo., cloth gilt, 2s. 6d (*postage 1d.*)

BIBLE HISTORY FOR SCHOOLS.

With Scripture Class Helps. Illustrated. 4d. (*postage 1d.*)

NOTES ON THE SHORTER CATECHISM.

By JOHN BURGESS, M.A. Part I.—Questions 1-38, 4d. (*postage 1d.*)

Part II.—Questions 39-81, 6d. (*postage 1d.*)

Part III.—Questions 82-107, 6d. (*postage 1d.*)

WIRE WORK FOR BOYS AND GIRLS.

By CHARLES E. DAWSON. With 25 Diagrams. Crown 4to., paper cover, 1s. 6d. (*postage 1d.*)

These exercises are the outcome of practical work in manual training carried out by the author.

TOY-MAKING FOR BOYS.

By CHARLES E. DAWSON. With 23 diagrams. Crown 4to., paper cover, 2s. (*postage 1d.*)

ENGLISH GRAMMAR, COMPOSITION, AND PRECIS WRITING.

By JAMES CONWAY, Headmaster at Cleveland-st. Superior Public School, Sydney. Prescribed by N.S.W. Department of Public Instruction for Teachers' Examinations. New edition, revised and enlarged. Crown 8vo., cloth gilt, 3s 6d. (*postage 2d.*)

A SMALLER ENGLISH GRAMMAR, COMPOSITION, AND PRECIS WRITING.

By JAMES CONWAY. New edition, revised and enlarged. Crown 8vo., cloth 1s. 6d. (*postage 1d.*)

BRUSHWORK FROM NATURE, WITH DESIGN.

By J. E. BRANCH, Superintendent of Drawing, Department of Public Instruction. Prescribed by the Department of Public Instruction, N.S.W., for Teachers' Examinations. With 19 coloured and 5 other plates. Demy 4to., decorated cloth, 7s. 6d. (*postage 3d.*)

THE SCHOOLMASTER (London): "The teaching is very carefully set out, and is quite up to the standard of English authors in the same subject. The plates, too, are very carefully described and explained, and many useful hints are embodied in the notes. We have nothing but praise for the matter, style, and get-up of the book."

CIVICS AND MORALS.

By PERCIVAL R. COLE, M.A., Ph.D., Assistant Principal Sydney Teachers' College. Second edition, revised and enlarged. Crown 8vo., in two parts:—Part I.—Moral Lessons for Classes I. and II.; Part II.—Civics and Morals for Classes III., IV., and V.; cloth, 1s. each (*postage 1d.*)

THE AUSTRALIAN OBJECT LESSON BOOK.

Part I.—For Infant and Junior Classes. Second edition, with 43 illustrations. Crown 8vo., cloth, 2s. 6d. (*postage 1d.*)

N.S.W. EDUCATIONAL GAZETTE: "Mr. Wiley has wisely adopted the plan of utilising the services of specialists. The series is remarkably complete, and includes almost everything with which the little learners ought to be made familiar. Throughout the whole series the lessons have been selected with judgment and with a due appreciation of the capacity of the pupils for whose use they are intended."

THE AUSTRALIAN OBJECT LESSON BOOK.

Part II.—For advanced Classes. Second edition, with 113 illustrations. Crown 8vo., cloth, 2s. 6d. (*postage 2d.*)

VICTORIAN EDUCATION GAZETTE: "Mr. Wiley and his colleagues have provided a storehouse of useful information on a great number of topics that can be taken up in any Australian school."

N.S.W. EDUCATIONAL GAZETTE: "The Australian Object Lesson Book is evidently the result of infinite patience and deep research on the part of its compiler, who is also to be commended for the admirable arrangement of his matter."

COMMONWEALTH MANUAL TRAINING SERIES.

CONCRETE GUIDE TO PAPER-FOLDING FOR DESIGN.
1s. 6d. (*postage 1d.*)

PUPILS' PAPER-FOLDING BOOKS FOR CLASSES I. AND II.,
CLASS III., AND CLASS IV. 1d. each.

TEACHERS' MANUAL OF CARDBOARD MODELLING FOR
CLASSES II. and III. (LOWER). 1s. (*postage 2d.*)

PUPILS' CARDBOARD MODELLING AND DRAWING BOOK.
3d.

A NEW BOOK OF SONGS FOR SCHOOLS AND SINGING CLASSES.

By HUGO ALPEN, ex-Superintendent of Music, Department of Public Instruction, New South Wales.
8vo., paper cover, 1s. (*postage 1d.*)

GEOGRAPHY OF AUSTRALIA AND NEW ZEALAND.

Revised edition, with 8 maps and 19 illustrations. 64 pages. 6d. (*post free 7d.*)

GEOGRAPHY OF EUROPE, ASIA, AFRICA, AND AMERICA.

Revised edition, with 18 relief and other maps, and 17 illustrations of transcontinental views, distribution of animals, &c. 88 pages. 6d. (*post free 7d.*)

GEOGRAPHY OF NEW SOUTH WALES.

With 5 folding maps. 48 pages. 6d. (*post free 7d.*)

PRACTICAL GEOMETRY.

For Classes II. and III. With Diagrams. 2d.
For Classes IV. and V. With Diagrams. 4d.

PRACTICAL AND THEORETICAL GEOMETRY.

Books I. and II. Price 6d. each.

BOYS' AND GIRLS' AIDS TO ARITHMETIC:

A Series of Diagrams for the Guidance of Pupils.

Demy 4to., paper cover, 6d. (*post free 7d.*)

AUSTRALIAN SCHOOL SERIES.

GRAMMAR AND DERIVATION BOOK, 64 pages. 2d.

TEST EXERCISES IN GRAMMAR FOR THIRD CLASS, FIRST YEAR, 64 pages. 2d. SECOND YEAR, 64 pages. 2d.

TABLE BOOK AND MENTAL ARITHMETIC. New edition, greatly enlarged. 34 pages. 1d.

HISTORY OF AUSTRALIA, 80 pages. 4d. Illustrated.

GEOGRAPHY. Part I. Australasia and Polynesia, 64 pages. 2d.

GEOGRAPHY. Part II. Europe, Asia, America, and Africa, 66 pages. 2d.

EUCLID. Books I., II., and III. 2d. each.

ARITHMETIC AND PRACTICAL GEOMETRY—EXERCISES FOR CLASS II., 50 pages. 3d.

ARITHMETIC—EXERCISES FOR CLASS III., 50 pages. 3d.

ALGEBRA. Part I., 64 pages. 4d. Answers, 4d.

ALGEBRA. Part II. To Quadratic Equations. Contains over 1,200 Exercises, including the University Junior, the Public Service, the Sydney Chamber of Commerce, and the Bankers' Institute Examination Papers to 1900, &c., 112 pages. 4d. Answers, 4d.

THE METRIC SYSTEM OF WEIGHTS AND MEASURES, AND DECIMAL COINAGE.

By J. M. TAYLOR, M.A., LL.B. With Introductory Notes on the Nature of Decimals, and contracted methods for the Multiplication and Division of Decimals. Crown 8vo., 6d. (*post free 7d.*)

THE AUSTRALIAN LETTERING BOOK.

Containing the Alphabets most useful in Mapping, Exercise Headings, &c., with practical applications, Easy Scrolls, Flourishes, Borders, Corners, Rulings, &c. New edition, revised and enlarged, cloth limp, 6d. (*post free 7d.*)

THE AUSTRALIAN COPY BOOK.

Approved by the Departments of Public Instruction in New South Wales, Queensland, and Tasmania, by the Public Service Board of New South Wales, and by the Chief Inspector of Catholic Schools. In 10 carefully-graded numbers, and a book of Plain and Ornamental Lettering, Mapping, &c. (No. 11). Price 2d. each. Numerals are given in each number.

A.C.B. Blotter (fits all sizes), 1d.

CHAMBERS'S GOVERNMENT HAND COPY BOOK.

Approved by the Department of Public Instruction. In 12 carefully-graded numbers and a book for Pupil Teachers (No. 13). 2d. each.

The letters are continuously joined to each other, so that the pupil need not lift the pen from the beginning to the end of each word. The spaces between the letters are wide, each letter thus standing out boldly and distinctly by itself. The slope is gentle, but sufficient to prevent the pupil from acquiring a back hand. The curves are well rounded, checking the tendency to too great angularity.

ANGUS AND ROBERTSON'S PENCIL COPY BOOK.

Approved by the N.S.W. Department of Public Instruction. In nine numbers. 1d. each. No. 1, initiatory lines, curves, letters, figures; 2 and 3, short letters, easy combinations, figures; 4, long letters, short words, figures; 5, long letters, words, figures; 6, 7, and 8, capitals, words, figures; 9, short sentences, figures.

THE REFORM WRITING BOOKS.

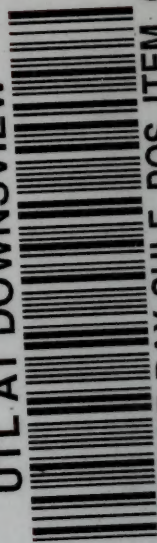
With directions for teaching writing on the Reform system. Nos. 1, 2, and 3, 1d. each; Nos. 3A, 4, and 5, 2d. each. Pamphlet on The Teaching of Writing, 1s.

**PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET**

UNIVERSITY OF TORONTO LIBRARY

H&SS
A
3147

UTL AT DOWNSVIEW



D RANGE BAY SHLF POS ITEM C

39 09 09 02 03 013 5